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JOURNAL OF
Agriculture

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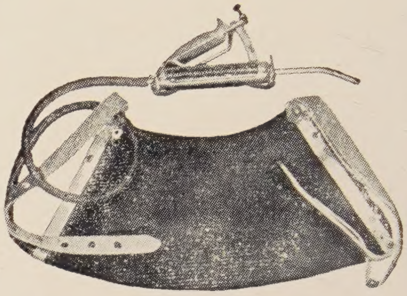

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This month's cover

Flowering kowhai at Waipiro Bay is the subject of this month's cover, which has been reproduced from a natural-colour photograph by National Publicity Studios. Unusually colourful among native trees, the kowhai flowers in early spring in northern districts, a feature of the species being that it is deciduous and the flowers appear before the leaves. Waipiro Bay is 69 miles north-east by road from Gisborne and is one of the settlements of the extensive sheep farming area around East Cape, most of which was developed from heavy bush, pastures being surface sown after the trees had been felled and burnt.

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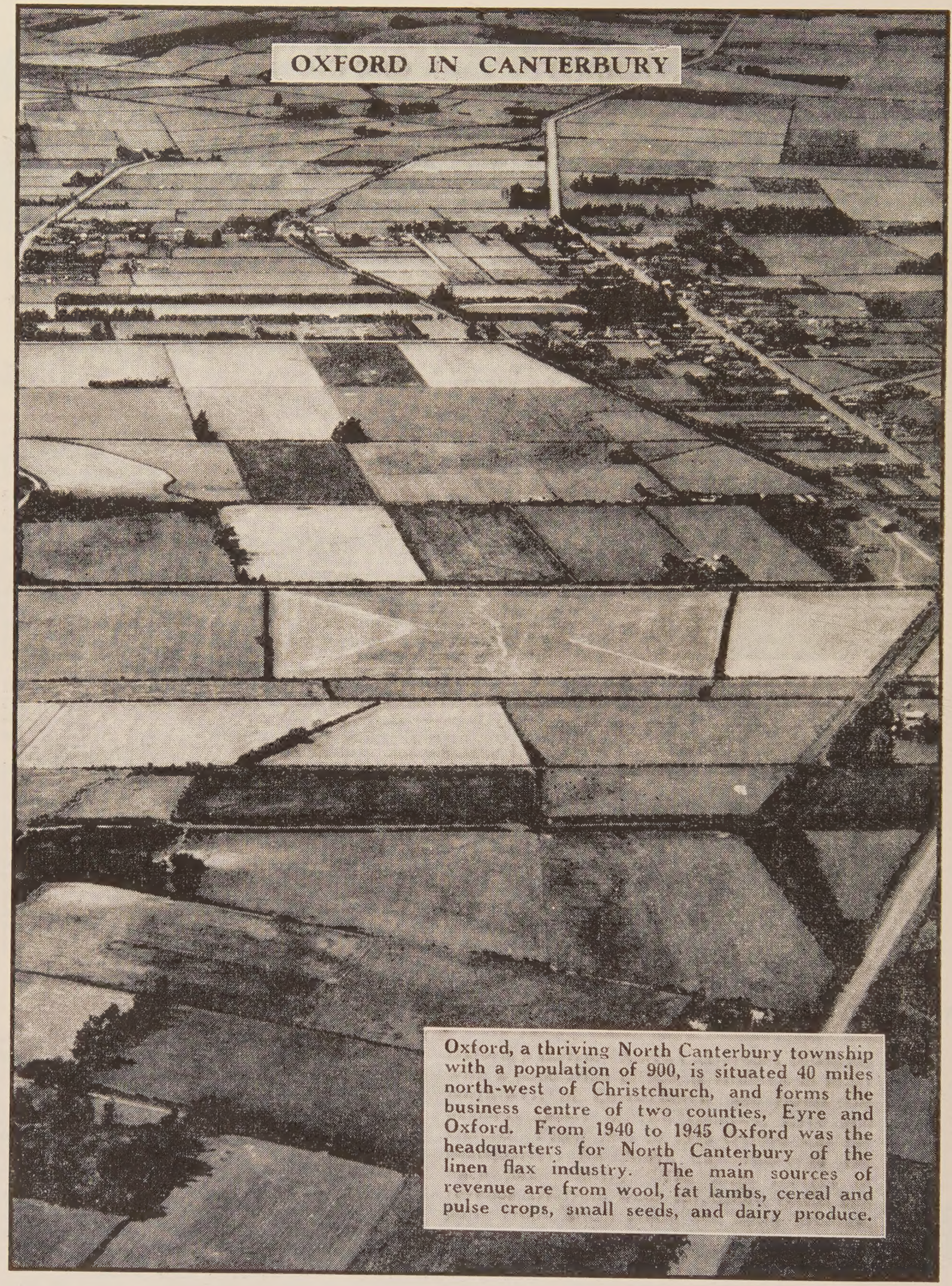


OXFORD IN CANTERBURY

Oxford, a thriving North Canterbury township with a population of 900, is situated 40 miles north-west of Christchurch, and forms the business centre of two counties, Eyre and Oxford. From 1940 to 1945 Oxford was the headquarters for North Canterbury of the linen flax industry. The main sources of revenue are from wool, fat lambs, cereal and pulse crops, small seeds, and dairy produce.

[V. O. Browne photo.

EFFICIENCY AND QUALITY IN AGRICULTURE

DURING the past 6 months I have had many opportunities of meeting my fellow-farmers in a diversity of activities on and off their farms. It has been a particularly interesting experience to attend in my capacity as Minister of Agriculture conferences of most of the major organisations of the farming industry and to see in operation the machinery of the several bodies that administer the interests of different sections of primary producers. One of my deepest impressions has been of the calibre of the men taking leading parts in the conduct of the business of these organisations and the sacrifices of time they are prepared to make toward the advancement of the industry.

Co-operation of the Industry

When some months ago the producer organisations gave me an assurance of their full support in the prosecution of the Government's increased production plans, I felt that we were on the threshold of a new era in co-operation in our agricultural development. The many instances I have had since of the strength of these organisations within their own spheres and the sound basis on which they are founded have given me new heart to face a period which may contain difficulties that will require clear thinking, mutual good will, and the co-operation of all sections of the industry to surmount.

Eagerness for Better Husbandry

Our role as a major food-exporting country has been an easy one to play for some years when our total surplus production has been assured of a ready sale. It is a healthy sign that in spite of the comparative ease with which the fruits of the soil can be produced in New Zealand, with its adequate rainfall and equable climate, there is little evidence of an inclination to let Nature do everything for us. Farmers generally are eager to exert extra effort toward better husbandry and increased production, and avail themselves quickly and intelligently of advances in agricultural knowledge developed and tested in our research stations and disseminated by an efficient extension organisation.

World Markets May Change

Reports of difficulties our representatives have met in Britain in conducting the primary produce price negotiations may have created anxieties in some minds. It may be salutary for us to be reminded after years of maximum demand at high prices for our products that the days of keen competition on the world's markets may soon return and that we may be approaching a period when our customers will be offered increasing quantities of quality products by competitive sellers. These are conditions of which many of the older men in the industry have experience and wide knowledge that will undoubtedly stand us in good stead should there be a major change in the conditions of disposal of our primary products.

It is unfortunate, perhaps, that though Nature has been bountiful in this country in the conditions of soils and climate she provides favourable to livestock production, her gifts have not been diversified. Our economic eggs must continue to be placed largely in the one basket—the export of livestock products.

Our continued prosperity and the maintenance of our standards of living can be assured only by concentrating on efficiency and quality in production. There is no more discriminating buyer than she who buys for the larder. In times of scarcity food is readily saleable and quantity may assume greater importance than quality. Let quantity be assured, however, and quality becomes the deciding factor.

Increasing World Population

World population figures have mounted rapidly in recent years and the cultivable area of the earth's surface has decreased. If food distribution problems that have concerned such organisations as FAO in recent years could be overcome and world economy could be geared to the solution, no food-exporting country need be concerned about disposal of surpluses. Although the thoughts of all men who have mankind's welfare, and even survival, at heart must be bent to such a solution, in the meantime we must hold our place in an imperfect world.

Unused Potential of Farmlands

It is our present duty to use to the full the resources at our disposal. We would be failing in that duty if, while there are peoples in the world with less than the means of subsistence, we did not assure maximum production from our farmlands. I have frequently asserted that our full potential is yet far from being realised, and this conviction has been strengthened by a recent report of an economic survey in my own county of Akitio. This shows that production there could be increased by full application of present agricultural knowledge and improved management methods to the value of nearly half a million pounds. Similar surveys are being conducted in other counties as part of the increased production programme. With the support of the farming community and producer organisations, knowledge we are accumulating of the unused potential of our farmlands can be applied quickly and efficiently. If, with increased quantities, we also maintain a jealous regard for quality, we should have little to fear in the foreseeable future.

K. J. HOLYOAKE, Minister of Agriculture.

CARE OF LIVESTOCK DURING SEPTEMBER

Contributed by the Animal Research Division.

ROTATIONAL GRAZING OF CALVES

WELL-REARED cattle at the Department of Agriculture Animal Research Station, Ruakura, outproduced their poorly reared mates by a total of 40lb. of butterfat over the first two lactations; both groups were treated alike from first calving onward. Frequent changes to good, clean pasture are essential if calves are to be successfully reared. (See notes in the July issue of the "Journal".) Rotational grazing avoids deaths in winter, eliminates the need for drenching against worms, and produces yearlings 100lb. heavier than those kept in the one paddock for weeks at a time.

* * *

FEEDING THE MILKING HERD

Autumn-saved pasture is almost equal to high-quality spring pasture as a milk-producing fodder. It should therefore be rationed to the milking cows to make it last until the spring feed comes away and hardens up. An electric fence is essential for efficient utilisation, enabling it to be grazed in small breaks. Unless sufficient reserves of this pasture are available for full feeding, the balance should be made up with silage. Make sure enough hay is retained to balance up the lush spring growth.

* * *

CARE OF EWES WITH TWIN LAMBS

For the first month or 6 weeks of its life a lamb depends almost entirely upon its mother's milk. Research has shown that ewes rearing twin lambs give considerably more milk than those rearing singles. Ewes with singles are capable of producing more milk in the early part of lactation than the lamb can drink. This is not the case with ewes rearing twins, the two lambs together soon being able to take all the milk which the ewe can produce. For this reason ewes with twin lambs should be grazed separately and given the best feed available. Many farmers have worked out practical methods of achieving this.

* * *

CARE OF PIGS

Late-farrowed spring litters should receive special attention, since they will be approaching weaning age. Creep feeding is the secret of securing the heavy weaner, and best results will be obtained by having a supply of meal and milk always before the litter. Weaned pigs must be well fed, and if meal has been used before weaning, its use should be continued for at least a fortnight to avoid an after-weaning check. The meal ration should be reduced as the skimmed-milk supply increases. It is preferable to feed meal to weaners up to half their daily rations and give the milk saved to the store pigs rather than feed meal to the older pigs at this stage. Sows should be hand mated, and receive sufficient milk and meal to enable them to regain some of the weight lost during the previous suckling.

* * *

VACCINATION AGAINST SCABBY MOUTH

On farms where scabby mouth occurs each new crop of lambs should be vaccinated, and this is most conveniently done at marking. If lambs are not protected, they are liable to suffer a severe check, as the disease makes eating very painful. The vaccine, which is available free through any office of the Department of Agriculture, gives very good protection if properly used. Care is necessary to keep the needle prong clear of grease. If it becomes blocked, no vaccine is applied and lambs may still be susceptible.

* * *

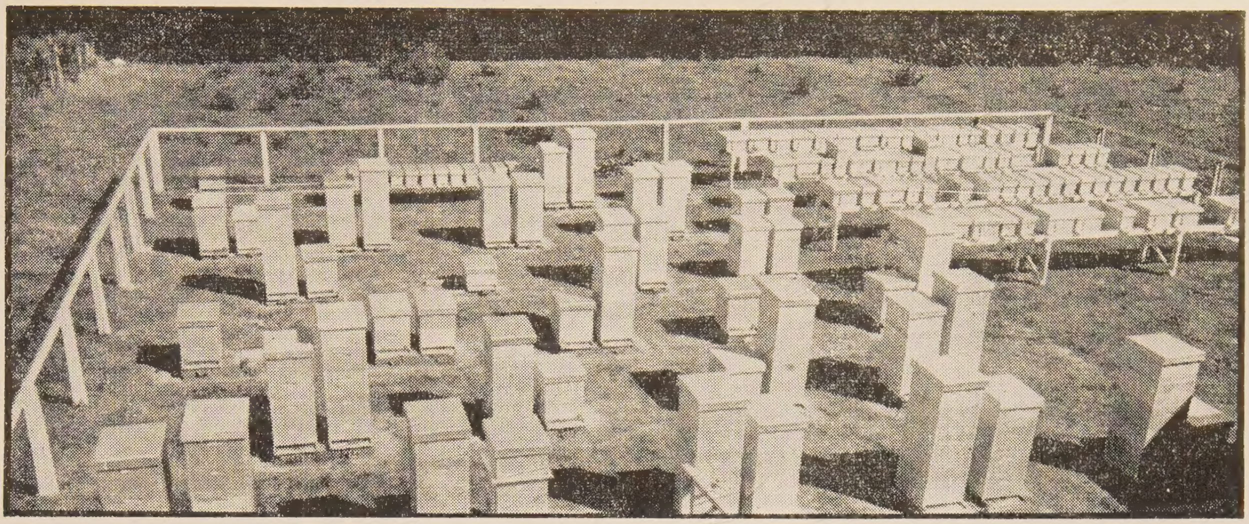
MASTITIS

Mastitis is usually most prevalent in spring. Milk from all quarters should be carefully examined in a strip cup each day. If there is any abnormality, treat the quarter without delay, using three tubes of penicillin cerate at 24-hour intervals. Prompt treatment at this time of the year will greatly reduce loss in production from light or dry quarters.

* * *

COCCIDIOSIS IN POULTRY

To prevent coccidiosis in chickens it is necessary to keep them growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine should be used in the drinking water. Full particulars of dosage may be obtained from Poultry Instructors of the Department of Agriculture.



HEADING PHOTOGRAPH: The apiary used in the insemination project at the Animal Research Station, Wallaceville.

Improving Strains of Bees by Artificial Insemination

THE application of artificial insemination of queen bees at the Department of Agriculture's Animal Research Station, Wallaceville, to a project for the improvement of strains of bees in New Zealand is described in this article by T. Palmer-Jones, a Research Officer at the station, and G. E. Miller, Horticultural Cadet, Auckland. Artificial insemination is the only method showing promise of being of practical value in the removal of the element of chance from the mating of queen bees and its replacement by a controlled method. Application of the method is still in the experimental stage, but great possibilities of improving strains of bees are evident.

COMMERCIAL beekeepers have long realised that the progeny of queen bees vary a great deal in their capacity to gather honey, tractability, swarming tendency, and other qualities. Selective breeding of queen bees for desirable qualities is the accepted practice, but in the past it has been much handicapped by the fact that the queen bee mates only in the air and not necessarily with drones from her own hive.

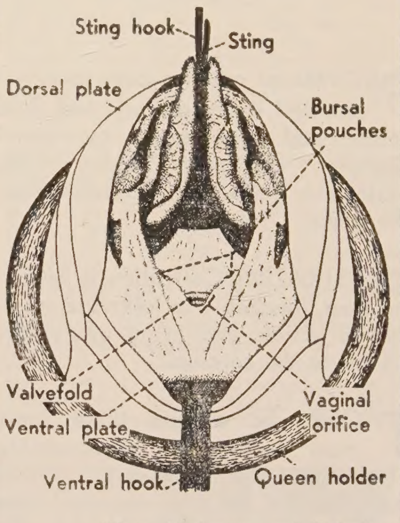
Commercial breeders of queen bees usually attempt to overcome this difficulty by placing their queen-rearing apiaries in isolated localities and stocking them entirely with what they regard as suitable bees for breeding. Under these conditions the air surrounding the apiary is saturated with drones of the right type and mismating is unlikely to occur. At best this method gives somewhat haphazard results and does not permit improvement of strains of bees by the methods which have been used with success in the breeding of domestic animals.

Many unsuccessful attempts were made to remove the element of chance from the mating of queen bees and to replace this with a controlled method. These attempts included mating the queen with approved drones in enclosures, mating the queen with a drone by the manual manipulation of the operator, and early attempts at artificial insemination. Artificial insemination was the only method which showed promise of being of practical value. After much painstaking work, Watson in America was able to demonstrate in 1926 a satisfactory method of artificially inseminating queen bees. Since then many American workers have gradually improved the instruments used and the technique of insemination.

The apparatus now used for artificial insemination, the technique of the method, and sufficient of the anatomy of the reproductive organs of bees for its understanding are described in a manual by Mackensen and Roberts (1) from which the following account is largely taken.

Anatomy of Queen Bee

In brief, instrumental insemination consists of removing semen from selected drones with a microsyringe and injecting it into the oviducts of a virgin queen bee. To make the process clear it is necessary to describe the anatomy of the queen bee in some detail.



[*From Mackensen and Roberts.*

Fig. 1—The sting chamber of a queen bee properly opened for insemination.

The tip of the abdomen of the queen consists of an upper, or dorsal, plate and a lower, or ventral, plate, which close at the tip like the two halves of a shell. The cavity enclosed by these plates is called the sting chamber. In Fig. 1 the tip of the abdomen is shown in proper position for artificial insemination, with the dorsal plate and the ventral plate drawn apart to expose the sting chamber and its structures, including the sting and the vaginal orifice.

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1. Mackensen, O., and Roberts, W. C. (1948); "A Manual for the Artificial Insemination of Queen Bees," United States Department of Agriculture.

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Fig. 2 illustrates the internal portions of the reproductive tract with the side toward the observer removed. A fold across the anterior floor of the sting chamber loosely separates a region called the bursa copulatrix from the sting chamber proper. The vagina, through its vaginal orifice, and the bursal pouches open into this region. The spermathecal duct from the spermatheca enters the vagina in front from above. Just below the opening of this duct is the valvefold, a large, tongue-like structure with transverse ridges, which make it distinguishable from other tissues when viewed through the vaginal opening. Its position is such that it can close the passage between the vagina and the middle oviduct with a valve-like action. The paired oviducts enter the middle oviduct anteriorly. They are large fluted structures capable of great expansion for the temporary storage of sperm after mating and of eggs in a laying queen. Each paired oviduct leads to an ovary. In Fig. 2 the reproductive tract is extended, but during insemination the queen is held in such a way that the vagina is collapsed, and the valvefold often appears to be just inside the vaginal opening (Fig. 1).

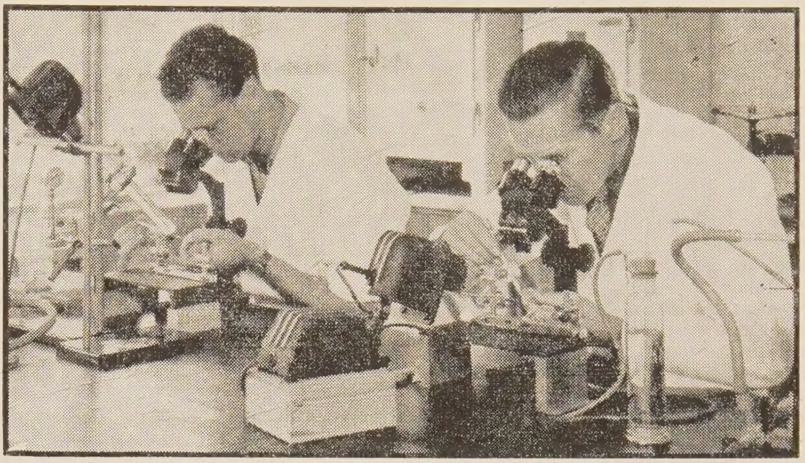
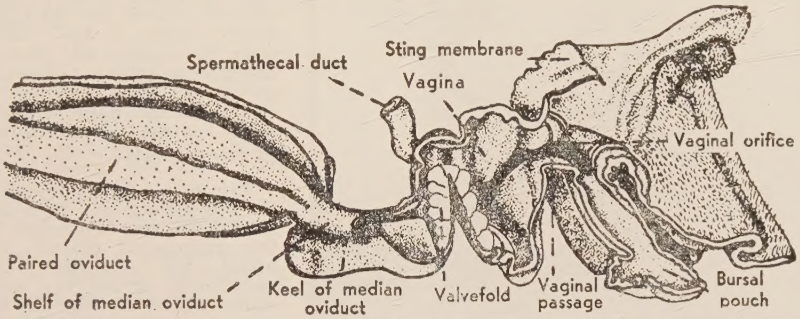


Fig. 3.



[*From Laidlaw.*

Fig. 2.

A knowledge of the anatomy of the reproductive organs of the drone is not required for artificial insemination.

In order that the semen may reach its natural position by artificial insemination, the valvefold must be pushed down to permit the point of the syringe to pass into the middle oviduct. If the syringe enters only the mouth of the vagina, the semen presses the valvefold against the middle oviduct and is forced back around the syringe and out into the sting chamber. The vagina is not easily distendable, but the oviducts expand to hold a large quantity of semen.

Equipment Used

A microscope and microscope lamp, an apparatus for delivering a steady flow of carbon dioxide, and a manipulating apparatus for holding the queen and instruments during insemination constitute the equipment used.

Microscope: The collection of semen from selected drones, the preparation of the queen for insemination by opening the sting chamber with instruments, and the insemination itself are all carried out under a microscope with a strong light focused on the queen. A magnification of 22.5 times is commonly used in the work. In Fig. 3 the operator on the right is shown using the apparatus to inseminate a queen while the operator on the left uses similar apparatus to load a syringe with semen from a drone.

Carbon dioxide supply: A very slow stream of carbon dioxide gas is passed over the queen to keep her anaesthetised while she is held in a plastic queen holder for insemination. The gas is supplied from a cylinder in which it is confined at a high pressure, and the pressure must be reduced before the gas reaches the queen. The apparatus for this purpose is shown in Fig. 4. At Wallaceville the ordinary diaphragm reducing valve (B), though capable of reducing the gas pressure to a few pounds, was found to be too insensitive. The difficulty was overcome by passing the gas, after it left

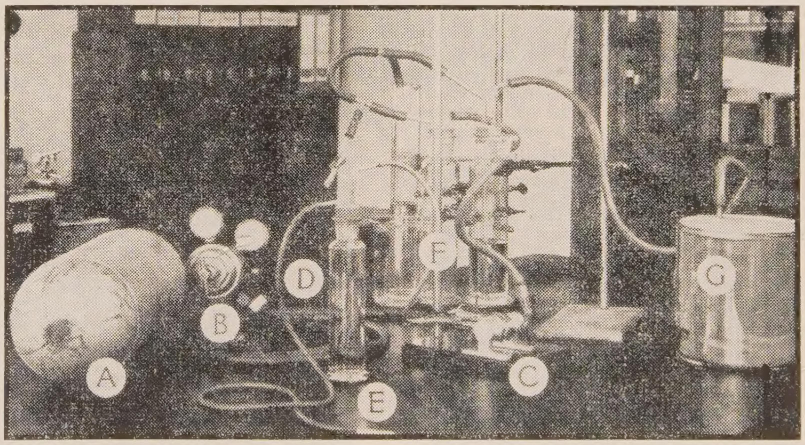


Fig. 4—The apparatus for supplying carbon dioxide gas for the anaesthetisation of queen bees during insemination. A: Cylinder of carbon dioxide. B: Diaphragm reducing valve. C: Chamber fitted with needle valves. D: Bubbler tube. E: Plastic tube for delivering gas to the queen holder. F: Alternative bubbling system. G: Container in which caged queens are treated with carbon dioxide.

the reducing valve, into a small chamber (C) fitted with leads the entry of gas into which could be controlled by fine needle valves. From one of these leads the gas was passed, through a bubbler tube (D) partly filled with water to the plastic tube (E) which delivered it to the queen holder. The gas could also be passed directly from the reducing valve (B) through a tube which could be closed with a stopcock and through the bubbling system (F) to the container (G) which was used for anaesthetising caged queens. The supply of carbon dioxide to the queen could be gauged easily by the rate of bubbling in the bubbler and regulated to give the minimum flow needed to keep the queen completely anaesthetised during insemination.

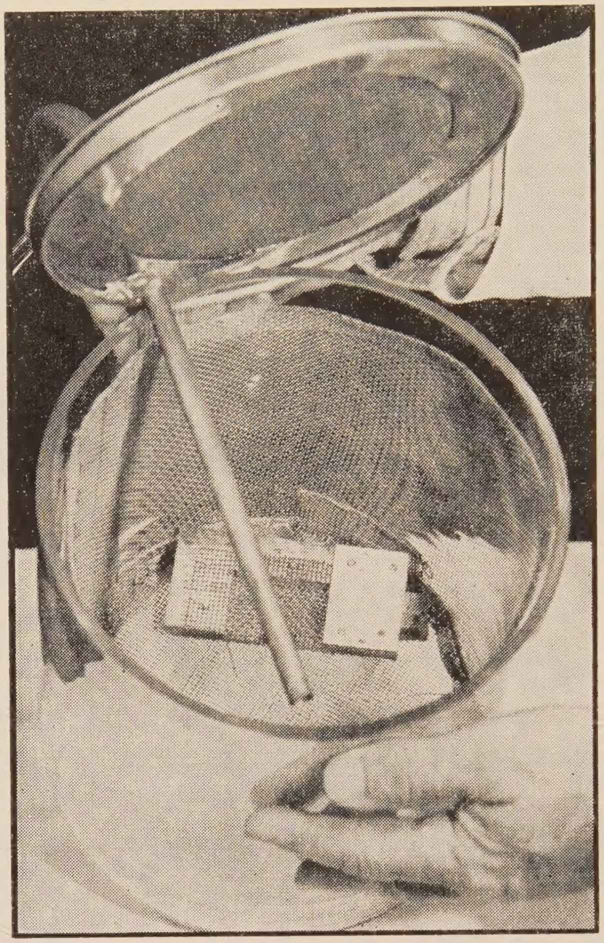


Fig. 5—A closer view of the container in which caged queens are treated with carbon dioxide.

The manipulating apparatus consists essentially of a heavy stand on which are mounted the queen holder, the syringe, and the holding hooks in such a way that they can be moved and adjusted easily (Fig. 6).

Syringe and instruments: A and B in Fig. 7 are the components of one of the latest-pattern syringes. It consists of a metal plunger which can be screwed up and down a barrel to exert pressure on a rubber diaphragm by way of an intervening piece of pointed metal. A plastic screw tip holds the diaphragm in place. Before use the syringe tip is unscrewed and its base filled with water. Then the semen is sucked into the tip by screwing the plunger back in the barrel. The probe (D) is used to push down the valve-fold so that the syringe can be inserted in the vagina. The holding hooks (E and F) are used to hold the sting chamber of the queen open during insemination. E is the ventral hook, which fits over the ventral plate, and F the dorsal or sting hook used to press the sting out of the way. A blunt dissecting needle is used to push down the sting so that the sting hook can be placed in position.

The manipulating apparatus, syringe, and instruments described were bought from the Department of Economic Entomology, University of Wisconsin, U.S.A. In the apparatus supplied the syringe mounting block could be adjusted to no greater extent than the ventral-hook and sting-hook mounting blocks. It was found of great convenience, however, to modify this part of the apparatus slightly by passing the screw supporting the syringe holder through a horizontal slot cut in a plastic syringe mounting block, which was then mounted on the metal pillar. The screw was flattened and fitted the slot closely so that it could not turn. The syringe holder could thus be moved in the horizontal plane in the same fashion as the queen holder. This arrangement allowed greater flexibility in adjusting the instruments before insemination and reduced the time of the operation.

The queen holder is a tube tapered at one end and with a movable stopper fitting closely inside. The queen is backed into the tube and held with the stopper so that her abdomen projects beyond the end. The stopper is bored out so that carbon dioxide can be allowed to flow round the queen, so keeping her anaesthetised during insemination.

Insemination Technique

The queen is run into a plastic tube of the same diameter as the queen holder. This is fitted with a plastic stopper which can be pushed along inside it and used to coax the queen tail first into the queen holder. The queen is always arranged so that when she is anaethetised her upper surface is to the right of the operator.

The two holding hooks are then inserted, one at a time, into the sting chamber and the abdominal plates pulled apart, the operation being performed under the microscope. The syringe is then placed horizontally in its holder so that its tip is in focus, ready to be filled with semen.

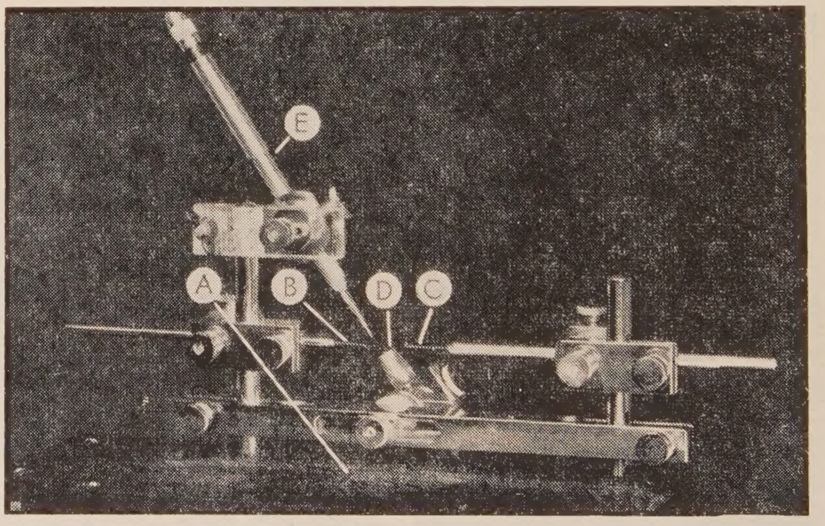


Fig. 6—The insemination apparatus. A: Stand. B: Sting hook. C: Ventral hook. D: Queen holder. E: Syringe.

The selected drones are anaesthetised by dropping them into a stoppered glass jar with a wad of cottonwool soaked in chloroform covering the bottom. The penis of a sexually mature drone usually everts partially under this treatment, and more complete eversion is secured by squeezing the drone between the fingers. The semen is cream coloured and can be distinguished from the white and more viscous mucous. When the penis is at the right stage of eversion for withdrawal of semen it is brought in contact with the tip of the syringe and the semen skimmed off by withdrawing the plunger (Fig. 8). Inseminations at Wallaceville were usually made with the semen from three or four drones.

Immediately after being filled the syringe is placed in position above the queen, its tip having been moistened with water to act as a lubricant. The sting hook is pulled so that the sting chamber appears as in Fig. 1. Then the probe is inserted into the vagina and the valvefold pushed down so that the syringe can pass over it into the median oviduct (Fig. 9). When the syringe is in position (Fig. 10) the plunger is slowly screwed down so that the semen enters the oviduct. If semen begins to well out round where the syringe enters the vagina of the queen, it indicates that the tip of the syringe is not properly in place and the syringe must be withdrawn and reinserted.

Though at first some trouble was experienced at Wallaceville in mastering the insemination technique, it was found that after several weeks of practice the operation could be performed without much difficulty. At this stage of proficiency the time required to remove a queen from the adjoining apiary and inseminate and return her averaged about 30 minutes.

Inseminations, usually two, are made from the fourth to the tenth day after the queen emerges, and should be two days apart.

Conduct of Project

Artificial insemination of queen bees has provided a practical means of improving strains of bees but, though a satisfactory technique has been evolved, its application to the best advantage is still in the experimental stages. From work carried out in America it appears that the only practical method is first to inbreed strains of bees and then to cross the inbred strains to produce hybrids.

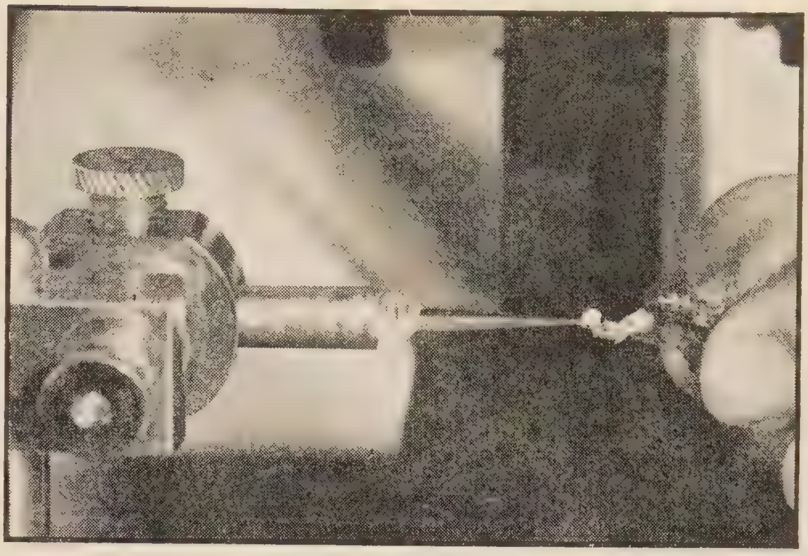


Fig. 8.

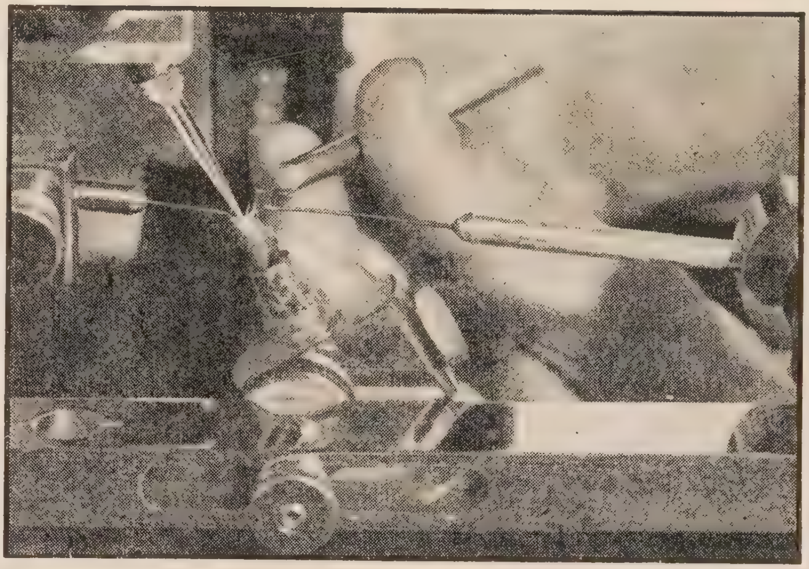


Fig. 9.

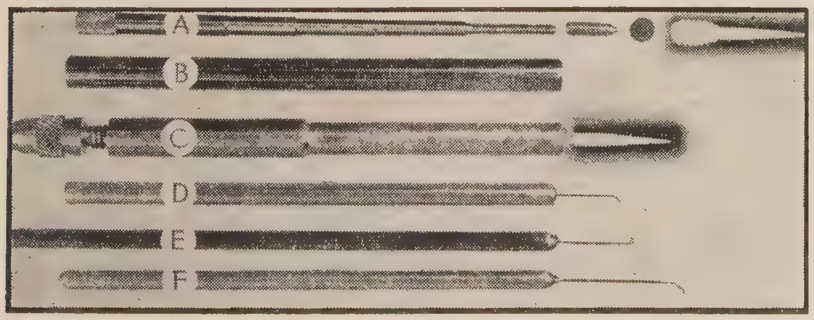


Fig. 7—A: The internal parts of a syringe. B: The barrel of the syringe. C: The syringe assembled. D: Probe. E: Ventral hook. F: Sting hook.

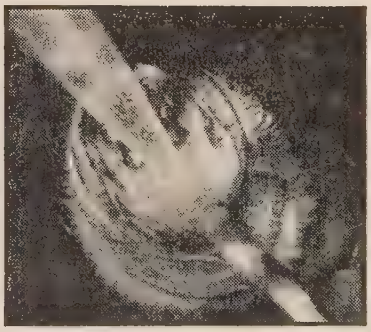


Fig. 10.

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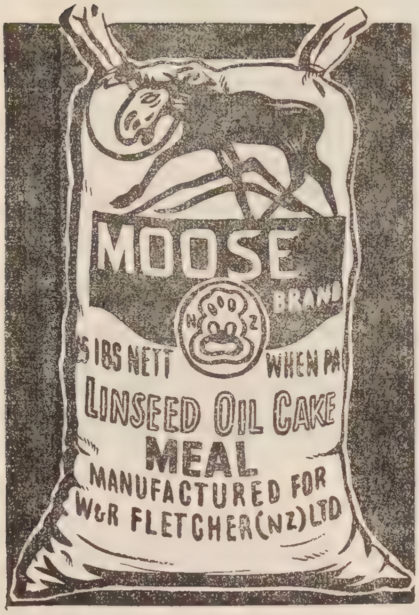

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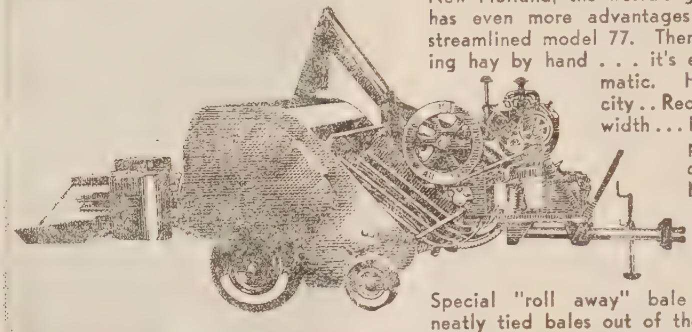

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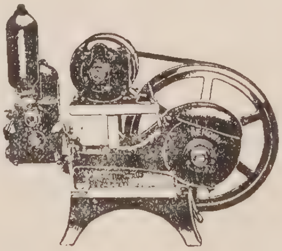

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ARTIFICIAL INSEMINATION OF BEES

The Wallaceville project entails first inbreeding selected queens, then crossing the inbred strains to produce hybrids, and finally testing the worth of these hybrids and their progeny by the criteria used in judging the value of queens raised commercially. Crossing of the inbred strains to produce hybrids is necessary because inbreeding reduces fertility, which this procedure restores. Inbreeding concentrates good and bad qualities, so that, though many hybrid queens will be much below the average in performance, others can be expected to be above the average. At this stage of the programme progeny testing will be carried out so that the best hybrid queens can be selected. These selected queens will be placed in isolated apiaries and young queens bred naturally from them tested further in these apiaries. Queens from the best hybrid strains will then be used for production of young queens by natural mating for further testing in commercial apiaries and at Wallaceville. Finally, suitable hybrid strains will be chosen for mass production of breeder queens, by natural mating, for supply to the industry. This programme will require at least 5 years for completion.

It is hoped in this way ultimately to supply the industry with queens better than those at present in use. As the desirable qualities of the selected queens become diluted by natural mating, it will be necessary to renew the strains from the laboratory apiary.

An association of breeders of queen bees has been formed to provide suitable stock on which to base the project and to furnish the necessary organisation for testing strains of queens produced in the course of the work. In October, 1949, 15 members of the association gave a total of 50 queens which are now established in nuclei in the laboratory apiary at Wallaceville and have provided all the stock at present being used in the insemination project.

Suppliers of queen bees were sent report sheets on which they noted the following particulars for each queen: Age of queen (month and year bred), longevity and stamina of strain, development and maintenance of brood nest, physical characteristics of progeny (males and females), temperament of progeny and quietness on combs when handled, swarming tendency, economy of winter stores, use of propolis, production of honey, seasonal conditions, main nectar sources worked by the colony, and general remarks. Thus a complete record of each queen bee was available for reference.

Recording System

Particulars of each queen were noted on numbered cards and discs bearing the same numbers were affixed to the appropriate nuclei. The number allotted the original queen remained constant for her and all queens bred from her, but this number was followed by a small 1 in the case of the original queen, by a 2 for her daughter, by a 3 for her granddaughter, and so on. By referring to numerals on nuclei in the apiary it was possible to tell how many generations the queens were removed from the original queen.

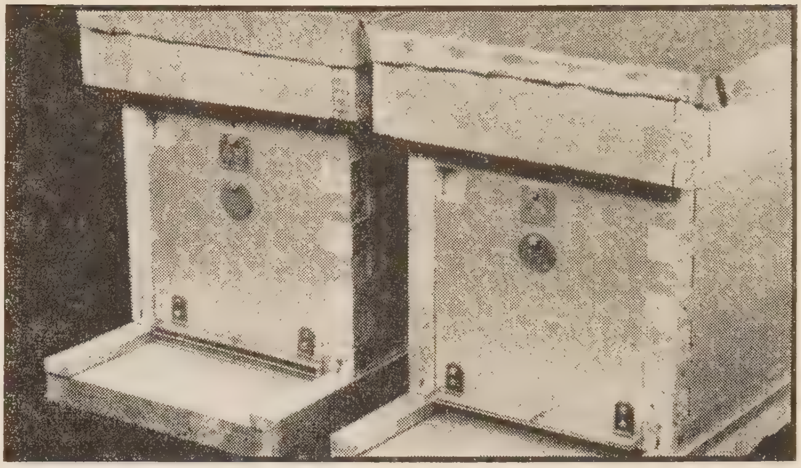

Fig. 11—Nuclei with hinged queen excluders across the entrances. The queen excluder on the right is raised.

The ages of the queens ranged from a few months to 2 years, the average being about a year. Judged by their performance at Wallaceville, which ranged from fair to good, these queens appeared a representative section of the breeders' stock.

Prevention of Natural Mating

On arrival at Wallaceville the queens given by breeders were placed in nuclei with strips of hinged queen excluder fitted across the entrances (Fig. 11). Throughout the work all descendants of these queens were placed in similarly treated nuclei, so that neither drones nor queens could enter or leave. Thus virgin queens were retained, without being able to leave the hive to mate naturally, until they were ready for insemination, and all drones in a nucleus were known to have come from its queen and not to have drifted in from other hives.

Type of Nucleus Hive Used

Nuclei were used throughout the insemination programme because of the ease and convenience with which they allowed bees to be handled. The most satisfactory type for much of the work was found to be a double nucleus formed by dividing a standard hive body with a division board and placing this on a flat bottom board. A hive mat was nailed down to the division board so that when bees were being handled on one side of the division board the mat could be folded back over those on the other side. Each nucleus had its own entrance hole and a ventilation hole covered with wire gauze, which were at opposite ends of the double nucleus above small projecting alighting boards. Such an arrangement allowed first and second generation queens to be established side by side, which was very convenient in apiary manipulation. Ordinary single nuclei were also used (Fig. 11).

Provision of Drone Comb

Large supplies of drone comb were required for insertion in nuclei so that drones could be raised from queens suitable for insemination. This comb was provided by inserting frames with small "starters" of foundation comb in strong hives, which were fed sugar syrup when the honey flow was insufficient to stimulate wax production.

Returning Queens after Insemination

Virgin queens were located as soon as possible after being hatched out and replaced in their nuclei inside queen cages closed with a removable cork plug. These queen cages were provided with small metal strips fastened at right angles to the tops so that the cages could hang between the frames and allow the bees easy access to the queens through the gauze. Queens were kept in the cages throughout the period during which they were being inseminated. Two days after the final insemination the cork plug was replaced with a plug of candy through which the bees could eat their way to liberate the queen. The use of this method reduced losses of queens caused by balling and maltreatment by the bees.

When she was removed for her first insemination each queen was marked with a white spot on the thorax and one of her wings was clipped (Fig. 12). This procedure ensured that subsequently queens could be found and observed easily.

Two Methods of Inbreeding

During the 1949-50 season inbreeding of queens at Wallaceville was carried out by two methods—brother-sister mating and mother-son mating.

Brother-sister Mating

The first system depends on mating a virgin queen with her brothers. A queen is removed from a nucleus and the virgin queen raised by the bees from one of her eggs inseminated with semen from her mother's drones. When this artificially inseminated queen is laying she is removed and the procedure repeated for two more generations, except that drones from the same source are used (back crossing). Then true brother-sister mating is used again. This is a slower method of inbreeding than the mother-son system, but it is much easier to carry out.

ARTIFICIAL INSEMINATION OF BEES

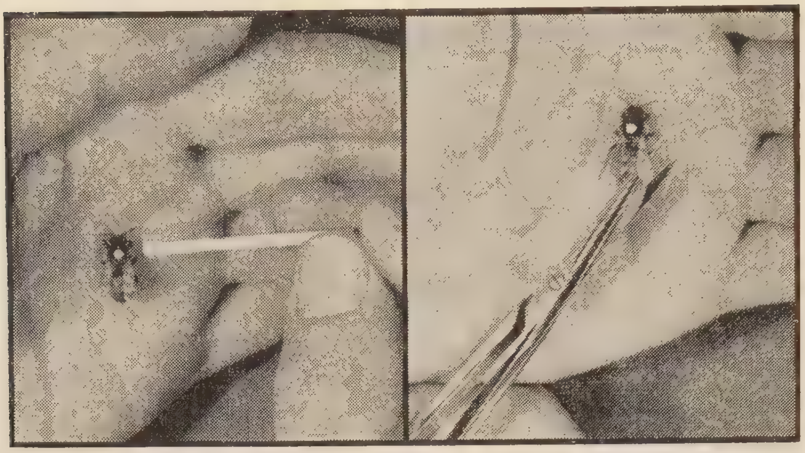

Fig. 12—Marking a queen and clipping her wing.

Mother-son Mating

It has been found that egg laying of virgin as well as inseminated queens can be stimulated by treatment with carbon dioxide. This causes the queens to begin laying almost as soon as naturally mated ones, whereas without it only about one in five starts earlier than 30 days after emergence. Two carbon dioxide anaesthetisations of 10 minutes, spaced a day apart, are used to start egg laying. The second treatment of the queen must be completed before the sixth day after emergence if she is to begin laying at the normal age (8 to 11 days after emergence). Thus drones can be obtained from virgin queens and later the virgin queens can be self-fertilised by inseminating them with semen from their own drones (2). According to Kalmus and Smith (3), mother-son mating is much the most efficient method of inbreeding bees to secure pure lines.

Comparison of Methods

The tables which follow compare the times required to complete one cycle of inbreeding with each method. The figures quoted are approximations.

Brother-sister Mating

In this method the nucleus must contain drone brood 14 days old before the queen is removed for the first inbreeding, so that the drones, which develop more slowly than queens, will be ready in time to provide semen for inseminating the virgin queen.

Time required for development of drone brood ..	14 days
Time required for bees to raise a virgin queen ..	10 days
Time between emergence of queen and completion of second insemination ..	7 days
Time required for queen to begin laying	6 days
Total time	37 days

In subsequent inbreedings the total time required would be either 23 or 37 days, depending on whether drones from the original hive (back crossing) or brother drones were used.

Mother-son Mating

In this method the queen is first removed from a nucleus.

Time required for bees in nucleus to raise a virgin queen	10 days
Time between emergence of virgin queen and completion of second carbon dioxide treatment ..	6 days
Time required for queen treated with carbon dioxide to begin laying in drone comb	10 days
Time required for drones to reach sexual maturity ..	30 days
Time required for queen inseminated with these drones to start laying ..	4 days
Total time	60 days

According to Kalmus and Smith (3), a complete cycle of mother-son mating (a double generation) is more than three times as effective as a complete cycle of the brother-sister method of inbreeding. However, 60 days are needed to complete a cycle of the first method, compared with 37 or 23 days for the second, so that if both were applied for the same period the mother-son method would be about one and a half times as effective for inbreeding as the other. The mother-son method, however, is the more difficult to apply.

The mother-son method depends on the bees tolerating a drone-laying queen for the period of some 30 days necessary for her eggs to develop into sexually mature drones which can provide semen for her insemination. It has been found that such a queen frequently is balled and finally killed by the bees in an attempt at supersedure.

The fates of 23 queens inbred by the mother-son method at Wallaceville during the 1949-50 season were:—

Total number of queens treated with carbon dioxide: 23		Total number of queens accepted after carbon dioxide treatment: 11	
Number found dead shortly after treatment: 12	Number accepted by bees: 11	Number of accepted queens inseminated with semen from own drones: 5	Number of inseminated queens accepted by bees: 1

Five queens accepted after the carbon dioxide treatment could not be inseminated, as their drones were not sufficiently mature.

Undoubtedly the losses shown were caused by balling and maltreatment of the queens by the bees, as these were noticed on many occasions when the nuclei were inspected. When balling of a queen was noticed the queen was smeared with honey and returned to the nucleus in a hanging queen cage closed with candy. Usually the method helps toward the acceptance of a queen by bees, but in this case it proved of little value, as did all other methods tried.

It was soon apparent that the mother-son method of inbreeding was not practicable, and it was abandoned and the brother-sister method alone employed.

The impractability of the mother-son system of inbreeding was confirmed by Dr. W. C. Roberts, of U.S.A., in a recent letter. He states that the degree of insemination of such queens is usually very low and frequently they become drone layers when overwintered. However, the brother-sister method allows 100 per cent. insemination and the queens can be overwintered satisfactorily.

Scope of Project

Forty-one queens were inbred by the brother-sister method at Wallaceville during the 1949-50 season. Thirty-eight of these were inbred for one generation and three were inbred for two generations. Twenty queens of those inbred for one generation were not accepted by the bees and were found dead after preliminary maltreatment. One queen of those inbred for two generations was lost. The extent to which inbreeding will be carried out will be governed to some degree by the hatchability of eggs of the inbred queen, but will extend for several generations wherever possible.

Throughout the work it has been found that the frequent handling of queens, the constant opening and closing of nuclei, and the use of queen excluders to bar the entry and exit of drones and queens all create highly artificial conditions which make the bees much less willing to accept queens than they would be if the queens had been allowed to mate naturally.

Though artificial insemination of queen bees offers great possibilities of improving strains of bees in New Zealand, its application is still in the experimental stage and a long period must elapse before the beekeeping industry can benefit from the work initiated at Wallaceville.

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2. Mackensen, O. (1947): "Journal of Economic Entomology" (U.S.A.), volume 40, number 3, pages 344-349.

3. Kalmus, H., and Smith, C. A. B. (1948): "Journal of Genetics" (Cambridge, England), volume 49, part 2, pages 153-158.

Mercury Bay Weed as a Lawn Plant

THE perennial *Dichondra repens*, a member of the convolvulus family, has some merit as an alternative to the better-known lawn grasses. Under the common name of Mercury Bay weed the plant has become quite well known, especially in the northern districts of New Zealand, and numbers of attractive lawns have been established with it. Though lawn grasses are preferable under most conditions, Mercury Bay weed has proved satisfactory on some lawns, where it stands up better to dry conditions than grass. Because some difficulties have been encountered in establishing lawns of Mercury Bay weed, W. S. Kemp, Orchard Instructor, Department of Agriculture, Auckland, explains in this article the conditions under which the plant will grow and describes methods of planting and cultivation which have been found successful.

AS can be seen from the photographs Mercury Bay weed is not a grass but a small, low-growing, creeping plant which roots at the nodes and has small kidney-shaped leaves. The foliage is a dark grass green (lighter coloured if the ground is very dry or the plants are unthrifty), and occasionally it turns brownish green for a short time in autumn.

Two of the main advantages of Mercury Bay weed are that it remains green throughout comparatively dry summer seasons and that it needs mowing only occasionally. Nevertheless, it requires some water and the lawnmower cannot be dispensed with.

On the other hand the weed is unsuitable for tennis lawns because its growth is too slow in re-covering worn patches, the soft, succulent leaves are inclined to be slippery, and the plant juices quickly stain tennis balls a dark green.

After a few seasons the original plants sometimes tend to "run out" in patches, which must be replanted carefully to prevent establishment of strong-growing weeds against which Mercury Bay weed cannot compete.

Under moist conditions the rapidly extending runners will invade cultivated garden soils in which they quickly become established and where they can be as great a nuisance as many other weeds. However, normal cultivation along the edges of garden plots will deal with that problem.

The plants will not thrive in districts subject to severe frost. American reports indicate that minimum air temperatures of 25 to 26 degrees F. (6 to 7 degrees of frost) are sufficient to cause severe injury, resulting in browning of the leaves, while lower temperatures may kill the plants. Equivalent temperature readings taken at ground level would be several degrees lower.

Preparation of Land for Planting

Preparation of the section to be planted should be as thorough as for a grass seed-bed. To give the soil time to settle down before planting is done the land should be levelled and dug over at least 6 weeks before, making sure that all weeds are completely buried or that difficult ones like docks are removed. At intervals up to the time of planting light surface cultivations should be given to destroy weed seedlings as they appear above the ground.

A dressing of a fertiliser mixture of 3 parts of sulphate of ammonia and 1 part of superphosphate applied at the rate of 1oz. per square yard should be worked into the soil just before the final raking and rolling before planting. Except on very acid soils liming is not necessary. Before the plants are set out the land should be given a final light raking and levelling, and should be rolled to consolidate the surface.

"Plugs"

The lawn is planted up by the unusual method of setting out "plugs" of Mercury Bay weed. The plugs, as shown in the illustration on this page, are 1½in. in diameter and 1in. thick, and are planted in holes of the same dimensions.

A special tool is used to cut the plugs from a nursery bed or lawn, and the same instrument serves to make the planting holes. One type of cutter, illustrated on page 111, will take one plug at a time, another kind is made from a cylindrical tube, with the lower cutting end sharpened and an outer collar fitted to regulate the thickness of the plugs. As successive plugs are cut out they push each other up through the cylinder and emerge at the top. For planting a lawn, cutting tools may be hired from some retailers of Mercury Bay weed plants, which are usually sold as plugs. A smaller and less expensive cutter may be purchased, or could easily be made, for planting small areas.

Planting the Lawn

Mercury Bay weed may be planted at any time of the year, but the best months are from October to January.

The plugs are set at varying distances apart (see the illustration on page 111); the closer the planting the sooner will the area be covered by plants. The usual spacings are from 4in. to 8in. between plants, although sometimes plants are placed at 12in. intervals. The governing factor is the amount the planter is prepared to lay out for plants. If plugs are set 4in. apart, four times as many plugs are required than if 8in. spacings are made. At 8in. intervals 20 are needed for each square yard of lawn.

Under satisfactory growing conditions a lawn area set with plugs at 4in. intervals will be completely covered within 2 months of planting (see the illustration on page 111). The wider the spacing the longer is the time taken for the plants to cover the area. From a lawn closely planted in October it should be possible to cut plugs for a further area in January. Of course the holes in the lawn must be refilled with soil.

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A plug of Mercury Bay weed and a planting hole.

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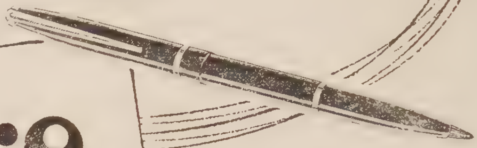

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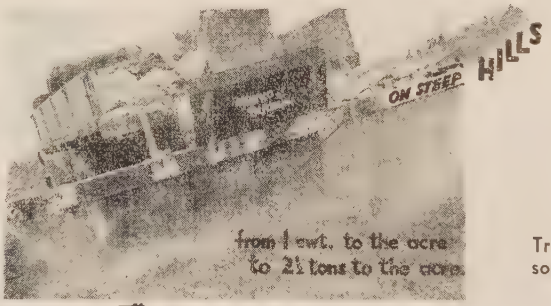

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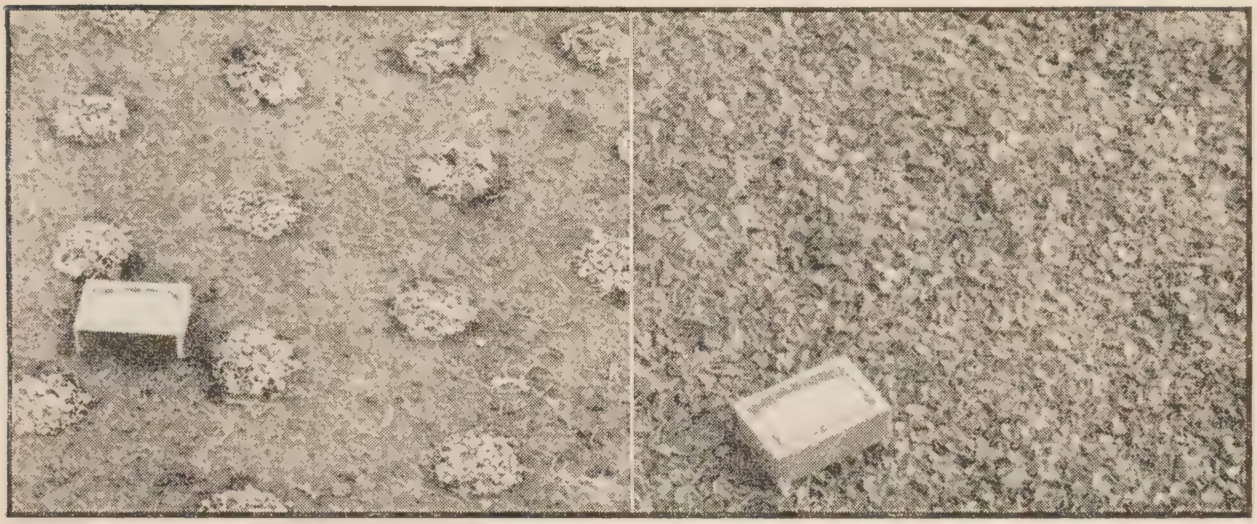
ESTABLISHING MERCURY BAY WEED IN A LAWN



[Sparrow Industrial Pictures Ltd. photos.

Left—A newly planted area of Mercury Bay weed. Right—Portion of a well-established lawn, showing the dense mat formed.

The actual planting is very simple. For the first row of plants a garden line is stretched along a few inches from one edge of the prepared land. The plug cutter is used to cut out planting holes at the chosen intervals along the line. Then the plugs are slipped into the neatly fitting holes and are pressed down with one foot. Planting is continued by moving the line across the area and setting out plugs in successive rows in the same manner.

When a section has been planted the new lawn should be carefully watered and should be rolled as soon as possible to consolidate the plugs and the surface of the soil.

Where it is desired to convert a large area of grass lawn to Mercury Bay weed the practice illustrated on page 112 has sometimes been adopted. Although it has the disadvantage that a longer period is required to make the desired change, it is a cheaper method.

The procedure adopted is as follows: After the number of plugs to be purchased has been decided the area which they will cover is prepared in the normal manner and the plugs set out. New sections are added as plugs become available from previously planted areas.

The small centre plot shown in the illustration on page 112 was planted first and the surrounding area was planted later.

Care of Lawn after Planting

During the period taken by the plants to cover the soil completely, systematic, ruthless suppression of weeds must be the first consideration. Weeds are sure to appear in the spaces between the growing plants, but they must not be allowed to remain there. The worst offenders are clovers, coarse grasses, and the ubiquitous flat or broad-leaved weeds. Mercury Bay weed cannot grow either over or under such intruders and therefore cannot grow into the compact and even lawn which is always the aim, unless the weeds are removed before they grow large.

For the first few weeks weeding can be done most quickly with a sharp narrow-bladed hoe, but when the lawn plants creep further over the bare spaces the hoe must be discarded and weeding of the reduced areas must be done with a smaller implement, such as a hand trowel or an old knife.

Once the Mercury Bay weed has grown into a compact mat over the whole plot weeds will have little chance of becoming established. However, odd ones will come through even the best-kept lawns and, as in grass lawns, they must be destroyed or they will eventually spoil the whole effect of neatness which is so much desired.

[Sparrow Industrial Pictures Ltd. photo.

A type of plugging tool which cuts one plug at a time.

Moss, which sometimes encroaches upon grass lawns, will also invade Mercury Bay weed lawns. It seldom gains a hold in a healthy lawn, but is inclined to appear in moist, shady places, especially if the lawn plants are weak. Careful weeding and an application of nitrogenous fertiliser will usually remedy this fault, but moss is rarely troublesome in a well-kept lawn which, with adequate supplies of fertiliser, is able to retain its supremacy over the slower-growing mosses.

Feeding the Lawn

In common with lawn grasses Mercury Bay weed needs applications of fertilisers to enable it to thrive and compete successfully against weed competition. Unfortunately there is no selective mixture which can be suggested to give this lawn plant an advantage over all undesirable plants, nor is it immune from a certain amount of foliage scorch due to applications of fertilisers, although it recovers its green appearance quickly.

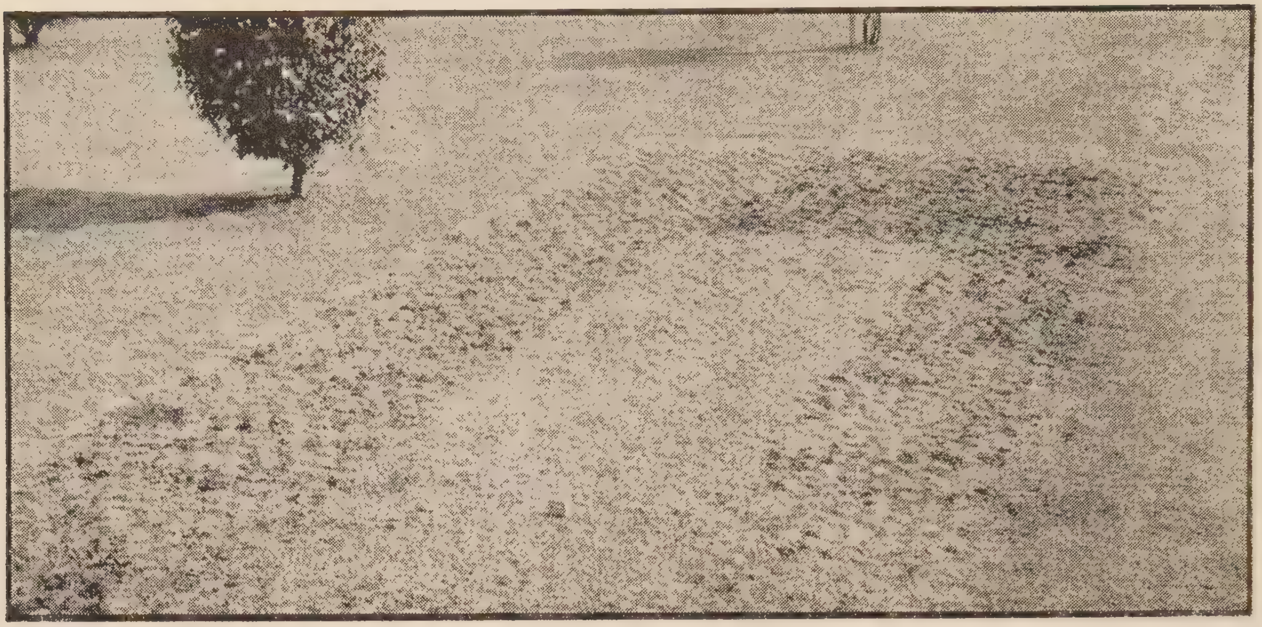
A recommended fertiliser mixture is 3 parts of sulphate of ammonia to 1 part of superphosphate, applied at intervals of 3 months (preferably in dull or showery weather to reduce scorching) at the rate of 1oz. to a square yard of lawn. The nitrogen content of this mixture, together with the fact that Mercury Bay weed needs little or no lime, tends to reduce competition from clovers.

Removing Weeds

If a compact growth of Mercury Bay weed is maintained, very few flat weeds will grow in the lawn, but grasses are more difficult to keep out.

The coarser grasses and odd flat weeds which usually grow in tufts can be destroyed by hand weeding. Finer grasses cannot be eradicated, but are not strong enough to crowd out the Mercury Bay weed, and do not adversely affect the appearance of the

MERCURY BAY WEED AS A LAWN PLANT



[*Sparrow Industrial Pictures Ltd. photo.*

Showing the method of gradual conversion from ordinary grass to a Mercury Bay weed lawn.

lawn. They do, however, make more frequent mowing necessary if they become strongly established. Fortunately, the finer grasses do not have much chance of growing in a dense mat of Mercury Bay weeds, and will not be troublesome if the ground is carefully prepared before planting time.

Mowing

A well-kept lawn of Mercury Bay weed needs very little mowing, but should be cut occasionally to keep the surface neat and level. Growth is very slow between the end of March and early September and the lawn may require no mowing in those months. During the warmer months, especially if rainfall is plentiful, growth is comparatively rapid, with the inevitable result that the lawnmower will have to be used five or six times during that period.

Although this plant thrives in rather dry, sunny situations, and remains green through fairly long dry spells, an occasional watering may be necessary to maintain its bright and fresh appearance.

Renovation of Old Lawns

After a few years there may be signs of the plants "running out" in patches. Usually these patches will show first where the original plugs were set, the younger growth remaining healthy. Replanting the weak patches with plugs from healthy parts of the lawn will remedy the fault.

Mixed Lawns

Some very successful mixed lawns of Mercury Bay weed and good lawn grasses are to be seen in the Auckland district. Most of these have been grass lawns in which plugs have been set without disturbing the grass.

If this type of lawn is desired, the best time to set the plugs is late spring or early summer as soon as spring growth of the lawn grasses slows down in the drier and hotter weather. The Mercury Bay weed then has several months in which to become firmly established before the autumn flush of growth gives the grasses another temporary period of supremacy before the semi-dormant winter period.

Mixed lawns need about the same amount of mowing as do grass lawns, but they remain much greener during the dry summer months. For those who value lawn clippings the mixed lawn has the advantage that it provides a supply of this material.

Mercury Bay weed will not dispose of all the problems and work associated with garden lawns, but, given the attention it merits, it will, in the warmer parts of New Zealand, give year-round greenness under conditions too dry for the usual lawn grasses.

Reference

"Construction, Renovation and Care of the Bowling Green," by E. Bruce Levy.

◆

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during June and for the 11 months ended June 30, 1950, with comparative figures for the same month and 11-monthly period of 1949, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

		Tons			Tons
Period	Creamery	Whey	Total	Percentage Inc. or dec.	Total in store at end of mth.
June, 1950	740	36	776	—	6,198
June, 1949	1,053	28	1,081	—	13,698
Increase or decrease	—313	+8	—305	—28.214	—7,500
For 11 months ended 30/6/50	141,175	2,900	144,075	—	—
For 11 months ended 30/6/49	142,182	2,633	144,815	—	—
Increase or decrease	—1,007	+267	—740	—0.510	—

CHEESE—

		Tons			Tons
Period	White	Coloured	Total	Percentage Inc. or dec.	Total in store at end of mth.
June, 1950	1,386	63	1,449	—	17,654
June, 1949	1,346	110	1,456	—	11,653
Increase or decrease	+40	—47	—7	—0.480	+6,001
For 11 months ended 30/6/50	78,656	21,572	100,228	—	—
For 11 months ended 30/6/49	89,438	5,163	94,601	—	—
Increase or decrease	—10,782	+16,409	+5,627	+5.948	—

If these figures are converted into butterfat equivalent, there is an increase of 0.879 per cent. in butterfat graded for the 11 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Seeding Rates for Pastures on Ploughable Land in Auckland Province

By J. E. BELL, Fields
Superintendent, Department
of Agriculture, Auckland.

FARMERS sowing down pastures frequently consult officers of the Extension Division not only about the choice of species but about quantity to sow. The advice given has been based on general experience, and experiments laid down have indicated this to be a very reliable guide. The seeds mixtures recommended in this article are for the general type of ploughable soils in the Auckland Province after thorough cultivation has been done and where adequate lime and fertiliser have been applied.

[National Publicity Studios photo.

THE trials on which mixtures are based have been laid down on varying soil types under different management and so give a fairly good cross-section of results which might be obtained on farms. The only objection which might be raised is that in the trials the palatable species often suffered by being more severely grazed than they would be normally if sown in a paddock on their own or in a mixture. The following outlines the results of the different rates of seeding of the various species the sowings of which were studied.

Perennial Ryegrass

Sowings of 10, 15, 25, and 45lb. per acre of perennial ryegrass were made with 1lb. and 3lb. of white clover with and without other species. Where conditions were poor for establishment up to 45lb. was needed, but where the seed-bed was properly prepared and weather conditions following sowing reasonable 25lb. produced a satisfactory cover. Fields Instructors of the Department of Agriculture have usually recommended about 25lb. of perennial ryegrass. In the early stages sowings of 10lb. and 15lb. were definitely unsatisfactory and the cover was in proportion to the amount sown. Thus in a trial where 25lb. produced a good cover, 10lb. produced about two-fifths, and 15lb. three-fifths of that cover during the first year. The estimated loss of grazing in the first year on the lightly seeded areas much more than covered the extra cost of seed where 25lb. per acre was used. In 2 or 3 years the lighter sowings catch up with the heavier sowings.

Perennial ryegrass, because it is a hardy plant under high fertility and stock grazing and because it establishes quickly, is the farmer's best weapon for preventing ingress to the sward of undesirable plants such as browntop and flat weeds. In one trial at Warkworth, sown down in the autumn of 1947 on land liable to browntop invasion, it was found that with seeds mixtures containing 10lb. and 20lb. of perennial ryegrass browntop invasion was rapid and fairly extensive. Where the mixture contained 40lb. of perennial ryegrass little browntop became established. Unfortunately this principle applies also in regard to desirable species, which may be paspalum, cocksfoot, or timothy. Trials show that ryegrass prevents these grasses from establishing, and with paspalum the amount sown affects the degree of establishment.

	Treatment		Density of	
Plot	Paspalum lb.	Perennial ryegrass lb.	Paspalum	Browntop
1	2	10	1	6
2	4	10	2	6
3	8	10	3	6
4	16	10	6	5
5	0	20	0	4
6	4	20	3	4
7	8	20	5	4
8	16	20	6	4
9	2	40	1	2
10	4	40	1	2
11	8	40	2	2
12	16	40	4	2
13	8	0	6	6

The table above, compiled from one of the trials with different sowings of ryegrass and paspalum, shows the effect on paspalum and volunteer browntop establishment. The figures relate to the density of paspalum and browntop 2 years after sowing, 0 showing none present and 10 a very high degree of cover of the particular species.

The only contradiction is plot 13 where the invasion of browntop was not as great as would be expected. There were many flat weeds in this plot, which may have inhibited browntop invasion to some extent. It will be noted that the paspalum strike was not inhibited until 40lb. of perennial ryegrass was sown. Later when paspalum becomes properly established the trial will reveal the effect of its establishment on volunteer browntop. It can be seen that the determining factors in the ultimate sward are complicated, species having different effects on each other. It is possible that in plots where the seeding rates of ryegrass were low and the ingress of paspalum consequently was earlier there may be less browntop, contrary to the early results from the trial.

Short-rotation Ryegrass

In trials varying rates per acre of short-rotation and perennial ryegrass were sown as follows, with 2lb. of white clover:—

Short-rotation ryegrass lb. per acre	Perennial ryegrass lb. per acre	Total ryegrass lb. per acre
10	0	10
15	0	15
25	0	25
35	0	35
45	0	45
0	30	30
5	25	30
10	20	30
20	10	30
25	5	30

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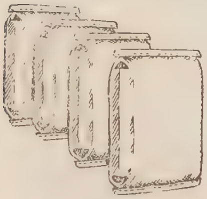

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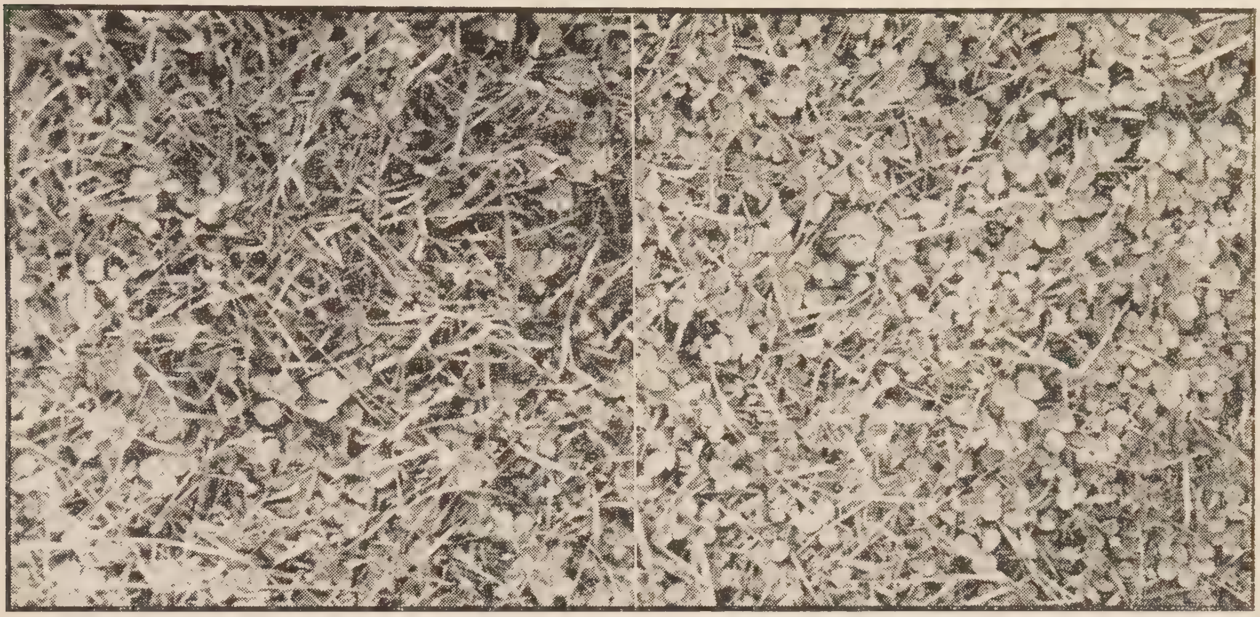


[Desgranges Studios Ltd. photos.

Left—Pasture seeded with mixture which included ½lb. of subterranean clover per acre, 3 years after sowing. Right—Pasture seeded with mixture which included 3lb. of subterranean clover per acre, 3 years after sowing.

In most of the trials the area surrounding the trial was sown with perennial ryegrass as the predominant species; consequently, because of its palatability, the short-rotation ryegrass in the plots was punished by stock and its chance of recovery in the next season diminished. In the first year greatest production was obtained where short-rotation ryegrass was sown alone with white clover at 25lb. to 35lb. per acre. In the mixtures of perennial ryegrass and short-rotation ryegrass the proportions of each which it is advisable to use depend on the recovery of short-rotation ryegrass. If short-rotation ryegrass fails to recover, sowings of it should not exceed 10lb. per acre, and probably a mixture containing 25lb. of perennial ryegrass and 5lb. of short-rotation ryegrass will be most satisfactory. Where the short-rotation ryegrass recovers very well a sowing of 15lb. of short-rotation ryegrass and 15lb. of perennial ryegrass will be most satisfactory. Between the extremes a sowing of 20lb. of perennial ryegrass and 10lb. of short-rotation ryegrass would be advisable.

To be persistent and to last several years or to be permanent, short-rotation ryegrass requires a fertile soil which is moist in summer yet reasonably well drained in winter, and grazing should not be severe, particularly in late spring and early summer.

Cocksfoot

Cocksfoot at 5, 10, 15, and 20lb. per acre was sown with 15lb. of ryegrass and 2lb. of white clover per acre, and cocksfoot at 10lb. per acre was sown without perennial ryegrass and with perennial ryegrass at 5, 10, 20, and 40lb. per acre and with white clover at 2lb. per acre. Under ordinary pasture management cocksfoot sown without ryegrass does not produce a satisfactory sward owing to slowness of establishment, and even with small amounts of ryegrass it is suppressed where the soil is fertile or well topdressed. The heavier rates of sowing of cocksfoot had little effect on establishment because of the strong competition from ryegrass. More than 5lb. per acre in the mixture, certainly not more than 10lb., is not advised. Even these sowings may be difficult to justify except in poor country or where the soil dries out. On dry soil 15lb. of cocksfoot may not be too heavy. On poor soil where the moisture supply is reasonably adequate the wisest course would be to buy more fertiliser with the money which might be used on extra cocksfoot seed if a heavy sowing was made, or to take other steps to make conditions more suitable for ryegrass establishment.

Timothy

Timothy was sown at 2, 4, 6, and 8lb. per acre with ryegrass at 15lb. per acre, and timothy at 6lb. per acre was sown without perennial ryegrass and with perennial ryegrass at 5, 10, 20, and 40lb. per acre. All mixtures included 2lb. per acre of white clover. Although conditions on all the trials appeared suitable for timothy establishment, results were the same as with cocksfoot. The ryegrass overwhelmed the timothy, and a poor-producing pasture was obtained from sowing timothy alone. Reports did not indicate that timothy was more severely grazed by stock than other species. Often severe grazing is usual and has been put forward frequently as the cause of a low percentage of this grass found in pastures. A seeding of 4lb. of timothy per acre appeared to give as good establishment as higher rates, and the same remarks apply to the sowing of this grass as apply to cocksfoot. Even this seeding is hard to justify. Timothy is more suited to fairly damp situations and for wet climates, and differs from cocksfoot in this respect.

Red Clover

Red clover trials were carried out with perennial ryegrass and Italian ryegrass. Sowings of red clover at 2, 4, 6, and 8lb. per acre were made with 20lb. of perennial ryegrass per acre and sowings of 5lb. of red clover per acre with 5, 10, 20, and 40lb. of perennial ryegrass. Six pound per acre of red clover appeared to give as good results as 8lb. with the 20lb. of perennial ryegrass. Amounts less than 6lb. did not give as good a coverage with this plant.

With Italian ryegrass, sowings heavier than 35lb. per acre suppressed the red clover and prevented its development and 6lb. of red clover was required and was definitely superior to sowings of 3lb. For temporary pasture, therefore, 25 to 30lb. of Italian ryegrass plus 5lb. or 6lb. of red clover appear to give the best results. This is in line with recommendations made by Instructors.

White Clover

Sowings of 1, 3, and 5lb. of white clover per acre were made with 20lb. per acre of perennial ryegrass and 2lb. of white clover per acre with 15, 25, and 45lb. of perennial ryegrass per acre. In the 2 or 3 years after establishment the 1lb. seeding has not produced as good a sward as the 2lb. or 3lb. seeding and the 5lb. seeding is not warranted. At least 2lb., which is generally recommended, should be sown.

SEEDING RATES FOR PASTURES ON PLOUGHABLE LAND IN AUCKLAND

Subterranean Clover

Sowings of ½, 1, 3, and 6lb. per acre of subterranean clover were made with 15lb. per acre of ryegrass and a sowing of 3lb. per acre of subterranean clover was made with 2lb. of white clover and 15lb. of ryegrass. The 3lb. sowing was most satisfactory and the 5lb. sowing did not appear warranted. At least 2lb. should be sown. The combination of 2lb. of white clover and 3lb. of subterranean clover was strikingly superior to the sowings of subterranean clover only. In summer and early autumn, when the subterranean clover was dead or there were only small seedlings, the ryegrass obviously suffered because no white clover had been sown. Because of the bulk of leaf produced in spring, subterranean clover is worth including, particularly for pastures where sheep, especially lambs, are grazed.

Conclusions

The results of the trials and general information indicate that for dairying the following mixture is suited to country of reasonably good fertility where a good seed-bed is prepared and the seed sown at a suitable time for establishment in autumn.

	lb.
Perennial ryegrass	20
Short-rotation ryegrass	10
Cocksfoot	5
White clover	2
Red clover	4
	41

Where paspalum is required and can be grown, up to 8lb. of this grass should be included. On clay soils where red clover establishment may not be obtained unless the soil is extremely well treated the sowing of this clover may be reduced to 2 or 3lb.

Short-rotation ryegrass may be increased or diminished at the expense of the perennial ryegrass according to soil conditions and pasture management to be followed.

On pastures for sheep and cattle the following mixture can be advised for general conditions:—

	lb.
Perennial ryegrass	25
Short-rotation ryegrass	5
Cocksfoot	5
Crested dogstail	3
White clover	2
Red clover	3
Subterranean clover	3
	46

No attempt has been made to prescribe mixtures for special conditions such as peat soils, tidal flats, limestone country, or alluvial swampy land where other species, including *Lotus major*, Yorkshire fog, or strawberry clover, may play an important part.

A GLYCERIA AQUATICA STAND

ILLUSTRATED is portion of an 18-acre stand of *Glyceria aquatica* on the property of Mr. H. Brickland, Pio Pio. It is an area which is covered by water when the Mokau River rises to flood level.

THE area was originally a swamp covered with niggerhead and raupo. During the autumn of 1932, 5lb. of *Glyceria aquatica* seed was sown on the area, but germination was exceedingly poor, only a dozen or so plants establishing. From these plants cuttings were taken and transplanted during summer and autumn, and in about 5 years the stand had been established over the whole area.

In a few more years the swamp which had been virtually a death-trap for cattle was rapidly converted into a safe, summer grazing area. Run cattle or dairy cows graze the area from January until a flood comes, generally in May or June, and silt is deposited on the leaf, spoiling it for grazing.

Carrying Capacity

The 18-acre stand is bounded by 35 acres of good pasture and the 53 acres has maintained 110 cows in good production for 6 weeks during dry periods. In recent years the dairy herd has been reduced, but the area still maintains 75 cows in full production and in addition up to 40 bullocks depend on it for feed.

This experience illustrates an important point in the relationship between soil and plant. The common practice is to adjust soil conditions so that they will permit specific plants to grow. In this case the soil has not been changed, but a particular plant that is adapted to the existing soil conditions has been used to considerable advantage.

Glyceria aquatica is often a serious weed in drainage areas and should not be planted where there is danger of its blocking drains in any part of a drainage system. In this instance it is fulfilling a very useful purpose by turning an isolated swamp into valuable grazing land.

—K. M. MONTGOMERY,
Fields Instructor, Department
of Agriculture, Te Kuiti.

Radio Broadcasts

THE following talks will be given to farmers from Station 1YA Auckland at 7.15 p.m.:—

September 6—"Current Farming Problems," by A. J. Kerse, Fields Instructor, Department of Agriculture, Auckland, and H. Woodyear-Smith.

September 13—"Mastitis in Dairy Cows," by I. G. Watt, Veterinarian, Department of Agriculture, Auckland.

September 20—"Results of Experimental Work on Peat," by F. B. Thompson, Agricultural Chemist, Rukuhia Soil Research Station, Hamilton.

September 27—"Young Farmers' Clubs," talk arranged by Hamilton District Committee, New Zealand Federation of Young Farmers' Clubs.

The following talk will be given from Station 1YZ Rotorua at 7.15 p.m.:—

September 14—"Young Farmers' Clubs," talk arranged by Matamata District Committee, New Zealand Federation of Young Farmers' Clubs.

Radio talks will be given to farmers from Station 4YA Dunedin at 7.30 p.m. as follows:—

September 6—"Management of Bees during Spring," by S. Line, Apiary Instructor, Department of Agriculture, Invercargill.

September 20—"Rearing and Management of Chickens," by H. G. Birnie, Poultry Instructor, Department of Agriculture, Dunedin.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Tuesdays at 7.10 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

Pig Broadcasts

Under the auspices of District Pig Councils broadcasts will be delivered in September as follows:—

Rotorua—1YZ, on September 28, at 12.35 p.m., "Questions and Answers," conducted by A. F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Wellington—2YA, on September 19, at 7.15 p.m., "Whey Feeding," by C. M. Bailey, Supervisor, Taranaki District Pig Council.

Electric Water Heaters in Milking Sheds

By R. GRICE, Special Inspector, Department of Agriculture, Whangarei.

BY virtue of the ease of operation of electric water heaters they are preferred to any other type by the great majority of dairy farmers. However, if they are to fulfil their function of providing boiling water for the cleaning and sterilising of milking machines and equipment, they must receive adequate attention and be correctly used.

WHERE electric reticulation of farming districts has been carried out dairy farmers have, as a matter of course, installed electric water heaters in their milking sheds until today it is unusual to see any other type in areas where electric power is available. Since electric water heaters are in such numbers, it is most important that they should be used correctly to safeguard the quality of milk or cream produced on the farms. Only by knowledge of their construction, care, and operation can this be achieved.

The dairy electric water heater consists of a copper cylinder, lagged with mill wool, the whole, except for necessary connections, being enclosed by a casing constructed from flat galvanised-iron sheeting. Unlike its counterpart the domestic water heater, the dairy type does not fill automatically from a supply tank and is not under pressure. Filling is in most cases done through a funnel on the top or side of the heater and water is drawn off by gravitation through a tap set near the bottom but above the element. The reason for this is that were the heater to fill automatically the ingoing cold water would soon cool the boiling water in the cylinder as it was being drawn off. But by non-automatic filling, the last gallon drawn off the heater will be of at least as high a temperature as the first and the benefits of this will be obvious.

The sizes of cylinders and elements to be installed are governed by a schedule in the Dairy Produce Regulations 1938, and are based on the size of the milking machine used. For bigger sheds slightly larger sizes of both are required where whole milk is produced for factory supply. The purpose of the regulations and the schedule it contains is to ensure that sizes of cylinders and elements will be sufficient for the boiling of water in sufficient quantity for the cleaning of the milking machine and dairy equipment at the times required. Before the gazetting of this regulation a number of cylinders of 12- or 15-gallons capacity were installed and were quite unsuitable for use in milking-machine sheds.

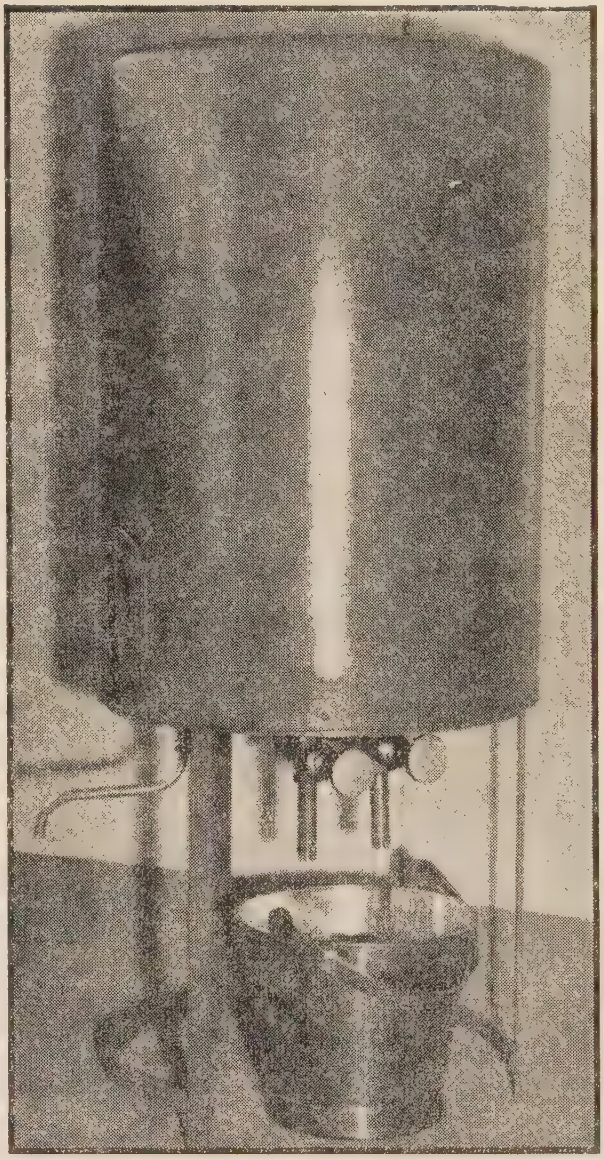
TABLE A: CREAM SUPPLY

Capacity of milking machine	Capacity of cylinder (gallons)	Rating of heating element: Continuous supply of electricity (watts)	Rating of heating element: Non-continuous supply of electricity (watts)
2-cow plant	20	600	700
3- or 4-cow plant	25	750	900
5- or 6-cow plant	30	1,000	1,200

TABLE B: MILK SUPPLY

Capacity of milking machine	Capacity of cylinder (gallons)	Rating of heating element: Continuous supply of electricity (watts)	Rating of heating element: Non-continuous supply of electricity (watts)
2-cow plant	20	500	600
3- or 4-cow plant	25	750	900
5- or 6-cow plant	40	1,100	1,400

The schedule provides for the use of two sizes of elements to suit the provision of "continuous" or "non-continuous" supply of electric energy to the heater. In the non-continuous supply of current the heater is disconnected as soon as the milking-machine motor operates and this type of supply is usual in dairying districts. In a few areas the power boards give a continuous supply in which the electric cylinder is connected during the time of milking operations. Both systems are satisfactory if the cylinder is carefully used and the heated water conserved.



Modern type of dairy water heater in which the cylinder is lagged with $\frac{1}{4}$in. asbestos sheeting. Two draw-off pipes and the overflow discharge are under the cylinder. Power is cut off by thermostat control only when the water boils, and loss of heat between milkings is negligible.

In 1939, as a measure to assist in the conservation of power, distributing boards were given authority to require the fitting of thermostats to dairy electric heaters and most did so. A condition of these installations was that the thermostat was so adjusted that the supply of current was cut off at a temperature of not less than 206 degrees F. and was renewed at a temperature of not less than 196 degrees F. While the installation of thermostats may not have saved a great deal of power in summer when farmers were making full use of the water in their heaters, they were very effective in doing this in winter. Contrary to a belief among some dairy farmers the installation of thermostats did not affect the heating capacity of the element until the temperature of the water in the heater reached at least 206 degrees.

The efficiency of an electric heater, judged on its capacity to provide boiling water at the times required, depends upon two factors—correct installation and judicious use in the shed.

ELECTRIC WATER HEATERS . . .

Correct Installation

The heater should be installed in a place where it is protected from wind and weather; preferably in a convenient corner of the separator or releaser room.

To prevent the casing from becoming rusty and perished an electric cylinder should not be installed on a flat surface of wood or concrete, as there is insufficient circulation of air to keep the base dry. Two very satisfactory methods which provide sufficient circulation of air are as follows:—

1. Set the cylinder on three suitable lengths of piping set across one corner of the room and fixed into the concrete walls.
2. Set the cylinder on two lengths of 4in. x 2in. timber, or on piping, set into a solid concrete base completely filling the corner of the room.

The height at which the cylinder is installed is most important. If the position is such that the draw-off tap is considerably higher than the receptacle to be filled, there is considerable loss of heat by radiation as the hot water is drawn off. The correct height of the installation should be governed by the size of bucket or receptacle to be used, and generally this should be so adjusted that the draw-off tap is about 14in. above floor level.

The schedule of sizes of cylinders and elements set out in the Dairy Produce Regulations has been suggested and approved by power-board engineers and authorities and is recognised as sufficient to provide boiling water at the times required, if the heaters are used carefully and correctly. Neither the sizes in the schedule nor any larger sizes which may be installed will be satisfactory for their purpose if they are abused. Some farmers get excellent results from a certain size of cylinder and element, while others, owing to lack of care and correct use, get very unsatisfactory results from the same capacities and sizes.

The careful and intelligent use of electric cylinders and elements is very necessary if they are to fulfil their functions properly. For efficient operation the following points should be watched:—

1. The casing and element should be kept as dry as possible during filling, water never being allowed to overflow except through the overflow outlet and then only for as long as it takes to turn off the filling tap. A dripping filling tap is very detrimental, particularly to those heaters with a short overflow pipe set in at the top of the cylinder, as water will run down the side of the casing and drip off underneath, quickly causing rust holes and wetting the lagging. To heaters with short overflow pipes a length of metal piping should be fitted so that the outlet is at a point below the heater.

Rubber tubing should not be used for this purpose. There have been cases where when old milk tubing was used it pinched during filling operations, with the result that a vacuum was created in the cylinder, causing the tubing to collapse.

2. It is essential to keep the lagging of the cylinder dry and in good order, as its purpose is to maintain in the cylinder the heat generated by the element. Where lagging becomes perished with age or wet by absorption or careless filling there will be a very considerable loss of heat. All possible care must be taken to protect the lagging from moisture, and where it is becoming perished it should be replaced.

3. Considerable loss of efficiency is caused by leaking draw-off taps. Such leaks can be prevented by grinding the taps into their sockets with grinding paste.

4. A very common and serious trouble in an electric water heater is that caused by mineral and sediment sludge in the water partly filling the cylinder or becoming attached to the element. Most water from underground sources contains mineral deposits and some of it is quite unsuitable for water heaters. Where minerals are very prevalent the element of the cylinder quickly becomes corroded with deposits to such a depth that it is more or less insulated and the quick passage of heat to the water is prevented. Wherever possible rainwater should be used in electric heaters to avoid such deposits and encrustations.

If electric water heaters and elements are to function efficiently, they should be examined periodically and attention given where necessary. The accumulation of sludge in the cylinder and encrustations of minerals on the element must be removed.

As boiling water is required for the efficient cleaning and sterilisation of dairy equipment, conservation of water in the cylinders is very necessary. Where boiling water is used lavishly and wastefully, causing the cylinders to be emptied after each milking, there is no prospect of boiling water being ready at the required times. Only quantities required for effective cleaning should be drawn off so that there is enough water left in the cylinder to raise the temperature of the intake of cold water.

If a cylinder is not producing boiling water and the element cannot be cleaned or increased in size, the quantity of hot water drawn off should be reduced and the intake of cold water reduced accordingly.

The electric heater was originally installed in milking sheds to provide water for washing the machines and utensils. Farmers, however, have found the hot water very useful in mixing calf meal and for washing the udders of cows. It is not suggested that these practices should be discontinued, but they should be done with the utmost economy of water from the heater.

The main points on the use of electric water heaters in milking sheds are:—

1. Correct installation, to prevent undue deterioration.
2. Draw-off tap to be at correct height; just above bucket.
3. Periodical attention to be given to cleaning of element to remove mineral deposits and to flushing of cylinder to remove sludge.
4. Conservation of water when washing up to leave as much as possible in the cylinder to assist in obtaining boiling water for the next milking.

Besides safeguarding the quality of dairy produce, an efficient water heater ensures that there is no wastage of power. This is also of particular importance to the dairy industry at this time.

Dairy water-heater manufacturers have made improvements to their products from time to time, but it is felt that more could be accomplished along the lines of stronger and less perishable casings, better-designed overflow outlets, taps which do not easily wear and drip, a sight glass for gauging the amount of water in the cylinder, and a socket and plug in the bottom of the cylinder to allow easy flushing.

With so much dependent on its efficiency, the dairy electric water heater is worthy of greater attention by both dairy farmers and manufacturers.

Horticultural Cadetships

THE Department of Agriculture is offering several bursaries for competition among boys of 17 to 19 years of age who are interested in careers as Horticultural or Apiary Instructors.

Successful applicants will be appointed as Horticultural Cadets and will undergo a 6-year training course which includes full-time university study for science or horticultural degrees, and several years' training in the field.

Bursaries while cadets are at university are worth £70 a year by way of allowance, plus £40 a year lodging allowance if a boy has to live away from home. They include also provision for payment of university tuition fees and the cost of standard textbooks.

Any boy who has the university entrance qualification or expects to have it this year may apply. The bursaries will be advertised in the Press in September, the closing date for applications being October 16, 1950.

Further details may be obtained from the Personnel Officer, Department of Agriculture, Box 3004, Wellington, C.1.

CHANGES OF ADDRESS OF "JOURNAL" SUBSCRIBERS

To ensure continuity of delivery of issues of "The New Zealand Journal of Agriculture," subscribers are required to give 4 weeks' notice of change of address. The old address and the new address, together with an address label clipped from a recent "Journal" envelope or wrapper, should be sent to the nearest office of the Department of Agriculture.

HEADING PHOTOGRAPH: In September advantage should be taken of fine weather to do preparatory work such as placing stakes in position to support tomatoes and peas. Sparrow Industrial Pictures Ltd. photo.

The Home Garden in September

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland.

SEPTEMBER is generally recognised to be a favourable time to begin the new season's gardening operations in earnest. With the advent of longer days and more sunshine the soil should have warmed up sufficiently to promote satisfactory germination of the hardier kinds of vegetable seeds. In northern districts where late frosts are unlikely seed of the more tender kinds of vegetables such as potatoes, cucumber, marrows, and pumpkins, and plants of egg fruit and tomatoes can be set out. Plant protection such as cloches and hot-caps will still be necessary for frost-tender subjects if they are grown in colder localities.

IN preparation for later cropping, areas in green crops should be dug over, and ground left fallow during winter can be broken down. The soil should be stirred up around planted crops. Cultivation of the soil, especially at this time of year when frequent rains consolidate the surface, is very important in the promotion of plant growth. The soil should be drawn up to established crops of cabbage, cauliflower, peas, and broad beans as they grow to provide support for the plant. When drawing the soil up to the plants a wide rather than a narrow ridge should be formed, as this provides better support and rooting area. Early potatoes should be kept well earthed up as a partial protection from frost. Seedling lettuce, onions, cabbage, and cauliflower can be set out.

Seeds of parsnips, carrots, spinach, onion, lettuce, radish, beetroot, silver beet, peas, and leeks can be sown in the warmer and better-drained parts of the garden provided the soil will break down to the required tilth. Clayey soils if sticky should be handled patiently and worked only when conditions will allow.

Established crops such as silver beet, cabbage, and cauliflower will benefit from weekly applications of liquid manure. This can be made from animal manure placed in a sack and suspended in a large container of water until the liquid is the colour of strong tea, or nitrate of soda, 2oz. to 4 gallons of water, can be applied at the rate of 1 pint to each plant. On wet soils the nitrate of soda may be applied direct to the soil at the rate of 1oz. to 12 plants, care being taken not to let the fertiliser touch the foliage.

Asparagus

Asparagus seed may be sown in September, but it is probably more satisfactory for the home gardener to procure 1-year-old crowns and plant them in June (later in southern districts). In northern districts established beds will now be sending up leaf stalks or spears. When they have made about 6in. of growth spears should be cut 2in. below the surface of the soil, using a sharp, long-bladed knife. A square-ended blade sharpened at the end like a chisel is very suitable for cutting the spears. Care should be taken when cutting asparagus not to damage young spears or crown buds. Weed growth should be kept down by hand weeding during the cutting period, as the hoe is liable to injure the young shoots that may be just under the soil surface. Applications of liquid manure every 14 days will increase the yield.

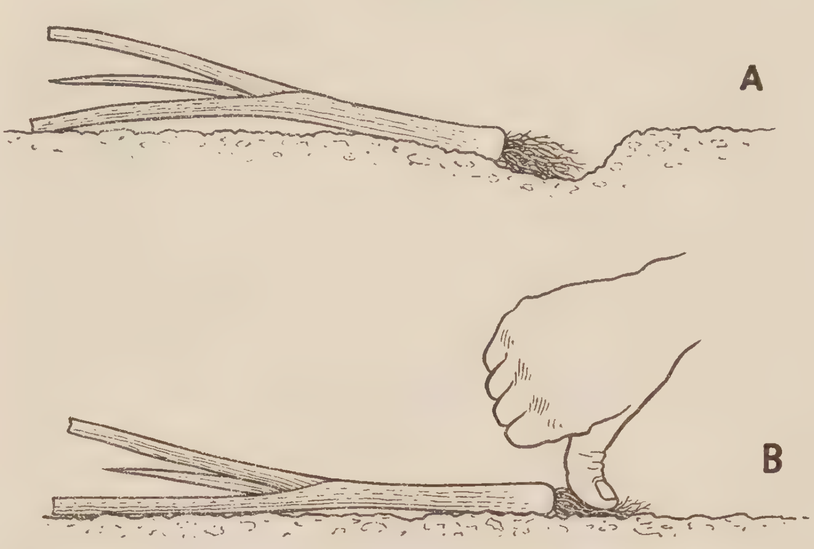
Good varieties are Mary Washington, Conover's Colossal, and Paradise. The last named is a recent introduction which is proving very satisfactory.

Artichokes

The globe artichoke is a vigorous perennial, the growth attaining a height of from 3 to 4ft. The large flowerheads when properly cooked make a very tasty dish. Plants may be propagated by suckers or seed may be sown in September or October and the seedlings transplanted to a permanent position during the following autumn. They require plenty of room to develop and plants should be set 4ft. apart each way. Suckers should be treated in the same way as seedlings. Flowerheads fit for use will develop the season after plants were set out and should be gathered before the scales open for flowering. Large Green and

THE HOME GARDEN IN SEPTEMBER

TRANSPLANTING AUTUMN-SOWN ONIONS



Plants may be set in a shallow trench (A); if the roots are covered and the soil firmed, they will quickly pull the plant into an upright position. The same result may be obtained by pressing the roots into the soil with the thumb or finger (B).

Large Purple are the commonly grown varieties, the former being more popular.

The Jerusalem artichoke is really a tuberous-rooted sunflower, the tubers of which form the vegetable. It is propagated from tubers, which throw out annual stems to a height of 6ft. or more. As they are rather difficult to eradicate when established, it is advisable to grow them in an isolated piece of ground. Avoid over-manured soils, which are liable to promote excess top growth at the expense of the tubers. Tubers may be planted during August and September in rows 3ft. apart, allowing 2ft. between plants. A good system for the home garden is to keep the plants on the same plot for several years, simply lifting the tubers each autumn or winter and replanting them in the same place; sufficient plant food should be added to keep up the fertility. Cultivation between the plants to keep down weeds is necessary until they throw out the tuber-bearing runners; all hoe cultivation should then cease. Tubers may be dug in autumn or winter and stored in dry sand or sawdust in a cool place.

White Jerusalem, which has pure white tubers almost round and with few and very shallow eyes, is the best variety.

Carrots

In most districts an early sowing of carrots may be made now, but for the main crop sowing is best deferred for another month. Where the depredations of the carrot rust fly (*Psila rosae*) are severe, infestation may be minimised by sowing the seed in December as far as possible from the position of previous carrot crops or of other susceptible crops such as celery, parsnips, or parsley. The rust fly is a small, two-winged, shining black, yellow-legged fly about 1/6in. long. It lays its eggs in the soil close to the carrot root, and the legless maggots enter the taproot of the carrot and work upward. The maggots grow up to $\frac{1}{3}$in. long and make small rust-coloured tunnels in the roots. Young plants wilt and die. This insect is very difficult to control, but horticultural naphthalene broadcast at the rate of 1oz. a square yard is an effective repellant; it does not damage the foliage and should be applied at intervals during growth but not later than 2 weeks before harvesting or there may be some residual taint of naphthalene after carrots are cooked. Another method found effective is to apply D.D.T. 50 per cent. wettable powder, $\frac{1}{2}$oz. in 4 gallons of water, along the plant rows when plants are about 2in. high and directly after thinning. Applications should be repeated at monthly intervals and should be sufficient to penetrate the soil to a depth of 3 or 4in.

The rust fly should not be confused with aphides which commonly attack carrot foliage in all parts of New Zealand; for control of carrot aphis spray at regular intervals with nicotine sulphate 1:800 (1 fl. oz. of nicotine sulphate to 4 gallons of water plus 2oz. of soft soap). Best results are obtained if the application is made on a hot day and the foliage is completely covered.

Soil preparation and seed sowing instructions are similar to those given for parsnips in last month's notes. Drills should be 12in. apart and the plants should be thinned finally to 4 to 6in. spacings.

Carrots, being much in demand for culinary purposes and being easily grown, should be included in every selection of vegetables for the home garden. If used before they are fully grown they are very tender and tasty. To secure a succession of young carrots seed may be sown from September to January in most districts.

Varieties: Popular early varieties are Earlycrop and Early Scarlet Horn, while for the main crop Chantenay, Manchester Table, and Oxheart or Guerande are satisfactory.

Celery

Where the home garden has facilities for raising plants seed of celery may be sown now for December and January planting out. It should be sown fairly thickly—about a level teaspoon to a standard box (24in. x 14in. x 4in.) containing specially prepared soil. The seed should be covered very thinly and firmed with a piece of board. When the seedlings are large enough to handle they should be pricked out 2in. apart each way into boxes from which they can be cut out later with the soil attached and planted in the garden. The seedlings should receive plenty of ventilation and should be kept about 12in. from the glass so that they do not become drawn. Premature seed development of plants is a frequent cause of disappointment to home gardeners and this condition is usually the result of a sudden check to the growth of the plant. This is often brought about by spells of cold weather.

Varieties: Self-blanching varieties are most popular in the North Island and favourites are Gilt-edged Golden Self Blanching and White Plume. Some gardeners prefer those which require earthing up or wrapping for blanching; Crystal or Solid White is perhaps the best for this purpose and is the usual variety grown in southern districts.

Celeriac or Turnip-rooted Celery

Celeriac, a member of the celery family, has a large, turnip-like root, which is the portion of the plant that is eaten. Celeriac is a good vegetable for flavouring soups and can also be boiled and sliced and served with white sauce or used fresh in salads. Seed may be sown from September to January and plants set out from December to March; treatment is similar to that for celery. Transplanting of the young seedlings is essential. Plant seedlings in rows on the flat (not in a trench like celery) 18in. apart and allow 12in. between the plants.

Celeriac should not be earthed up like celery, but will develop better bulbs if the soil is carefully drawn away from the plants at frequent intervals. The lateral shoots and fibres should be carefully removed to keep the roots intact, but in doing so growth and development must not be interfered with. The enlarged roots may be dug after they attain sufficient size for good edible quality and stored in sand. Before storing roots the outer leaves should be removed, but the centre or heart leaves must be left to prevent further development.

Frost-tender Vegetables

In most districts it is still too early to sow seed of frost-tender vegetables such as cucumbers, tomatoes, marrows, and pumpkins except under glass or other protective covering. Tomatoes take approximately 6 weeks and the other vegetables mentioned about 3 weeks from seed sowing until they are ready for transplanting and this should be taken into account when deciding on the planting programme.

Leeks

The leek is a member of the onion family and is a most delicious vegetable cooked or raw. Raw it is more tender and milder in flavour than the ordinary spring onion. It is very hardy and can quite easily be grown from seed sown in September or October for planting out in December and January. These plantings should give a continuous supply from May to August. Select a warm position in well-drained soil and sow the seed in drills ½in. deep and 6in. apart. As the seedlings take a long time to grow large enough for transplanting (lead-pencil thickness), frequent shallow cultivation is necessary to check weed growth and to aerate the soil.

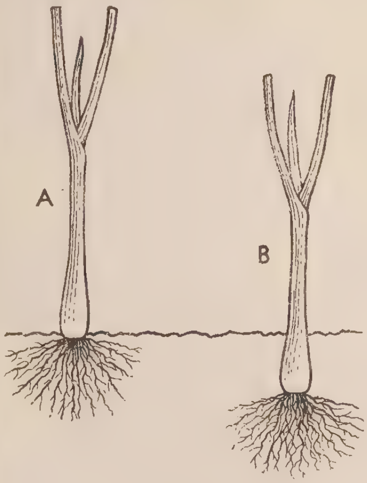
Varieties: Of the three popular varieties London Flag, Lyon, and Musselburgh, the last named is best for general use.

Onions

In northern districts, where it is usual to sow seed in autumn and transplant onions in spring, September is a favourable month to do transplanting. Where transplanting is not practised seed should be sown now in the permanent rows. The ground should be well cultivated and manured some time in advance of sowing the seed. Although a firm bed is required, the surface of the soil should be of a fine tilth to a depth of 1in.; if it is too consolidated, a crust which may seriously affect the germination of the seed may be formed. The amount of firming required is dependent on whether the soil is light or heavy. Light soil can be firmed by treading it whereas raking is usually sufficient for heavier soils. The onion plant requires a liberal quantity of available plant food and does best in soils that have been under cultivation for some time. The heavier soil types generally produce better-keeping onions. If compost or farmyard or poultry manure is not available, equal parts of bonedust and superphosphate plus 10 per cent. of sulphate of potash, broadcast over the area at the rate of ½lb. to the square yard and worked into the top 3in. of soil, will suffice for most soil types. A good dressing of wood ashes may be used in place of potash. The onion is very sensitive to soil acidity, and where periodical liming has not been practised at least 3 to 4oz. of carbonate of lime to the square yard should be applied.

[Sparrow Industrial Pictures Ltd. photo.

Early potatoes should be hoed frequently to promote growth, the soil being drawn up to form a ridge as they grow. Plants should be protected from frost damage by covering them at night. Straw or hay is very suitable for this.



Transplanting autumn-sown onions. The leaves and roots of the seedlings have been trimmed for transplanting. A is set at the correct depth, though it may appear shallow. If seedlings are planted too deep, as in B, thick-necked or irregular-shaped bulbs will result.

Sow the seed thinly ¼in. deep in rows 12in. apart, cover it with fine soil, and firm the soil over the seed.

Where onions are to be transplanted soil preparation is similar to that for a seed-bed. Shallow drills 12in. apart and 1in. deep are drawn out and plants set out 4in. apart in the drill. The roots are covered and firmed by drawing soil over them; alternatively the area may be marked out and the roots of the plants pressed into the soil at the correct spacings. (See the diagram on this page.) Plants need not be set upright, as they will soon straighten up after planting. Good bulbs will not develop if the plants are set too deeply. If roots are trimmed and tops shortened, planting can be done more easily and plants are not so likely to topple over after being set out. Cultivation should be sufficient to keep the surface soil aerated and check weed growth. It should always be shallow, care being taken not to injure the sides of the bulbs, because if they are cut, further growth will increase the size of the wound, and the keeping quality of the onion will be impaired.

Varieties: Straw Spanish, Pukekohe Long Keeper, and Brown Spanish are good-keeping varieties. If onions are not required for long storage, there are several high-yielding sorts, such as Ailsa Craig, Giant Rocca, and Golden Globe.

Green or Spring Onions from Sets

Stored onions should be examined and those bulbs that are beginning to shoot should be used or may be planted out in the garden. Draw out furrows 4in. deep and 15in. apart and set the bulbs 6in. apart in the rows just covering them with soil. By this method spring onions can be produced quickly. As growth develops seed stalks may appear and should be broken off as soon as they become visible. However, unless they are used promptly, onions grown in this manner soon become pungent and tough.

Potato Onions

Potato onions, which are of mild and pleasant flavour, are increased by dividing the compact clusters at the bases of the plants. The small bulbs are transplanted and grow into large ones which if left form further compact clusters. Culture is similar to that for shallots, which was described in last month's notes.

Egyptian or Perennial Tree Onion

The Egyptian or perennial tree onion produces a cluster of little bulbs on the top of a stalk. The bottom also divides, but large bulbs are not produced. The bulblets are used for pickles and salads. The top sets or bottom divisions are planted in May or September, preferably the former month, in furrows 4in. deep and 15in. apart, with 6in. between sets in the row.

As soon as frosts are over in spring the tops start to grow. Those produced from the underground bulbs are soon ready for use and those from top sets shortly afterward. This type of onion becomes very coarse and strong as the season advances, but early in the season is quite palatable.

Garlic

Garlic, a vegetable which is often regarded with disfavour, is eaten, though usually unknowingly, by many people as a flavouring and seasoning

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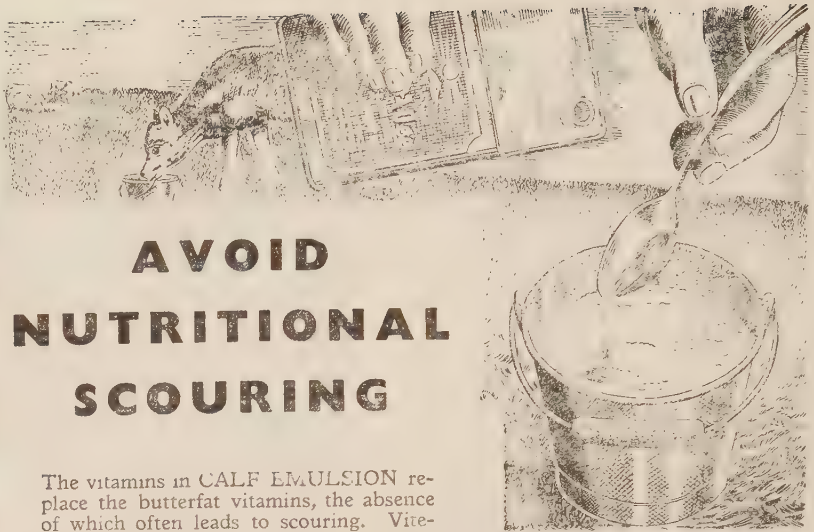

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in prepared food products such as soups and pickles. Garlic produces a group of small bulbs called cloves. The whole bulb is broken up and the small cloves are planted, the best sets being those taken from the outside of the bulb.

Garlic does well in a rich, light, well-drained soil, which must be well trenched and brought to a fine tilth. Drainage is important, as garlic tends to rot in wet soil. The cloves may be planted from May to September. Draw drills 1in. deep and 12in. apart and press in the cloves from 4 to 6in. apart. If cloves are planted in May, do not cover them immediately; the soil can be replaced level as cultivation progresses. For spring planting replace the soil and level it over the cloves after setting them out.

Growing Perennial Crops from Seed

Asparagus: Seed may be sown in September or October provided soil conditions are favourable. The soil should be well drained and of a fine, firm tilth with good humus content. Sow seed thinly ½in. deep in rows 12in. apart and thin seedlings later to 4in. apart in the rows. If growth has been favourable plants should have reached sufficient size for planting out into a permanent bed the following August or September.

Rhubarb: Though most home gardeners prefer to divide up crowns from established beds, rhubarb can be grown easily from seed sown in September or October. Sow seed 1in. deep in rows 15in. apart in any fertile, well-drained soil. Seedlings should be thinned to about 6in. apart as soon as they are properly established and the young plants can be lifted and replanted in a permanent position the following spring.

No stalks should be pulled from newly planted beds until the second year and the plants should be well supplied with humus and plant food. Rhubarb does best when grown in a warm part of the garden where it is not overshadowed by hedges or trees.

In some districts rhubarb is forced by covering the crowns with boxes or straw and when this is done care should be taken to see that the covering is replaced each time stalks are pulled, because although rhubarb is not classed as frost-tender, when forced it is liable to severe damage if suddenly exposed.

Recommended varieties are Victoria Giant and Champion (for summer use) and the everbearing or winter sort Topp's Winter.

Potatoes

In districts free from late frosts potatoes may be planted this month, but in most southern districts it is safer to delay planting a little longer. Government Certified seed, though dearer than uncertified seed, will be found more profitable, as usually it produces more vigorous and disease-free growth and a higher yield. Potatoes should be procured some time in advance of planting and placed in shallow trays in full light to sprout. Care should be taken to see that the sprouts do not grow too long (¼ to ½in. is ideal), as sprouts tend to break off when tubers are being planted if they are too long. If tubers produce more than two strong shoots and the potato is not large enough to cut, the weakest shoots should be rubbed off, as it has been noted by commercial growers that plants with more than two or three stems produce a large number of small tubers. When tubers are large they may be cut into two or more pieces, according to size, before planting, each piece having at least one shoot. Tubers should be cut into thick chunky pieces rather than thin slices and the eyes should be centrally situated and not at the edges of the pieces. If the terminal eye is at the extreme edge of a piece, its sprout fails to obtain adequate nutriment and weak secondary buds develop. Tubers should be planted within 24 hours of being cut.

[*Sparrow Industrial Pictures Ltd. photo.*

Home seed testing is simple. The illustration shows two home-made germinators. That at left is made by inverting one saucer over another. Two layers of blotting paper are placed in the bottom saucer to ensure an even supply of moisture. The saucers must fit together neatly to prevent the blotting paper from drying. The germinator on the right is made by inverting a glass jar over two layers of blotting paper on a pane of glass. With this type the sprouting seeds can be seen without disturbing the germinator. It is usually necessary to damp the blotting paper with water each day.

Preparation of Soil

Adequate cultivation and good soil conditions are essential for potatoes, and land containing an abundance of humus is preferable. Organic matter such as stable or farmyard manure is suitable, but should be applied some time in advance of planting. Too much nitrogen is not advisable, as it tends to produce heavy top growth at the expense of the tubers. In the absence of organic matter a fertiliser mixture of 1½ parts of superphosphate, 1½ parts of bonedust, ½ part of sulphate of ammonia, and 3 per cent. of sulphate of potash gives satisfactory results; alternatively equal parts of blood and bone and superphosphate and 3 per cent. of sulphate of potash may be used. These mixtures should be applied at the rate of 8 to 12oz. to 12ft. of row.

Planting

The most practical method of planting is to open a trench 4in. deep and broadcast fertiliser along it, mixing it lightly in the soil. Tubers can be planted in rows 2ft. to 2ft. 6in. apart with 12 to 15in. between sets in the rows. Close planting is more suitable for early crops. For early planting the soil should be ridged up over the sets, when the trench is being filled in, as this allows for better drainage and the soil keeps warmer. As soon as plants are 2in. above the ground hoe around them and loosen up the soil between the rows to check weeds and aerate the soil. Repeat this operation every 2 or 3 weeks, as the soil must be kept well worked to grow good potatoes. When plants are about 9in. high draw the earth round the stems and repeat this operation a month or 6 weeks later.

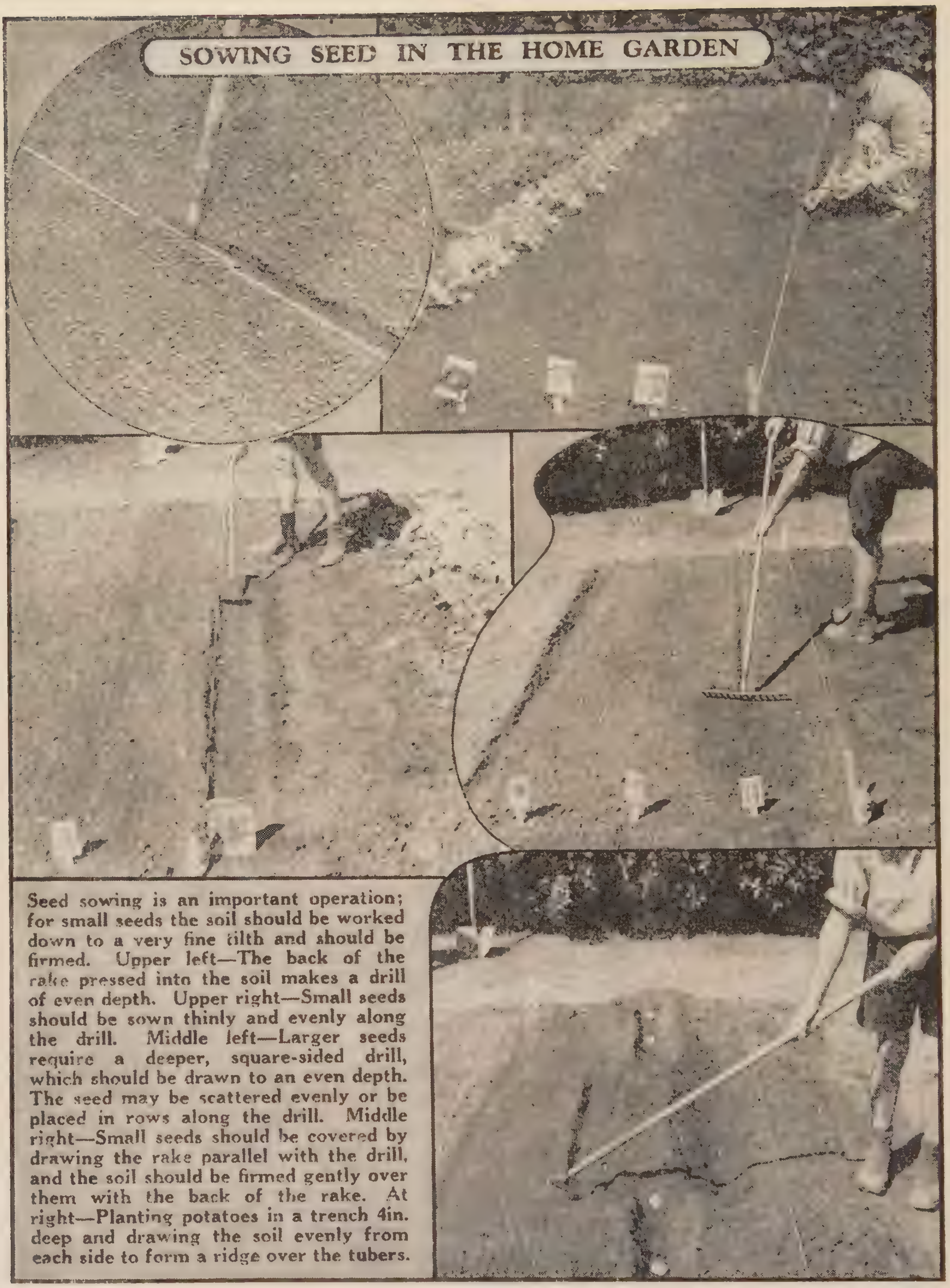
Harvesting

The amateur gardener generally has difficulty in judging when the crop is ready to harvest and often the quality of the potatoes is impaired by allowing them to remain too long in the ground. For early varieties digging should begin when the leaves of the plant begin to turn yellow and may continue until the crop is finished. Digging may extend over a month or more. Main-crop varieties take longer to mature, and if they are to be stored, they should be allowed to remain in the ground until the tops have died right down, as this improves the keeping qualities. When nearing maturity, especially when soil conditions are warm and a rainy period is experienced, they should be harvested promptly or the tubers will start growing and will become soft and unfit for use. When potatoes are ripe the skins are firm; if skins rub off, potatoes should be left to mature further if intended for storing.

Diseases

Potato blight caused by the fungus *Phytophtora infestans* is the most troublesome disease in some districts, but can be controlled satisfactorily by spraying plants with Bordeaux mixture, 4oz. of bluestone and 5¼oz. of hydrated lime to 4 gallons of water. Applications may be necessary as often as every 10 to 14 days in districts where blight infection is prevalent. Prepared Bordeaux powders or one of

SOWING SEED IN THE HOME GARDEN



Seed sowing is an important operation; for small seeds the soil should be worked down to a very fine tilth and should be firmed. Upper left—The back of the rake pressed into the soil makes a drill of even depth. Upper right—Small seeds should be sown thinly and evenly along the drill. Middle left—Larger seeds require a deeper, square-sided drill, which should be drawn to an even depth. The seed may be scattered evenly or be placed in rows along the drill. Middle right—Small seeds should be covered by drawing the rake parallel with the drill, and the soil should be firmed gently over them with the back of the rake. At right—Planting potatoes in a trench 4in. deep and drawing the soil evenly from each side to form a ridge over the tubers.

[*Sparrow Industrial Pictures Ltd. photos* the certified copper oxychloride mixtures are often preferred by home gardeners because of their ease of preparation compared with Bordeaux mixture.

Varieties: For early planting Epicure, Cliffs Kidney, and Arran Banner are recommended, for second early Arran Banner, Majestic, and Aucklander Short Top will be found satisfactory, and Arran Chief, Dakota Red, and Aucklander Short Top are popular as main-crop varieties. Dakota Red produces best in southern districts.

Salad Vegetables

As salad vegetables are best when young and fresh, frequent sowings are necessary. They should be grown rapidly and require a good, rich soil and a well-prepared seed-bed.

Lettuce

Seed of lettuce should be sown ¼in. deep in rows 9 to 12in. apart in well-drained and well-cultivated soil of high humus content. In cool weather lettuce do best when transplanted and are usually set out 9 to 12in. apart. In hot, dry weather they may be sown thinly in rows 12in. apart and later thinned to 9in. between the plants. Transplanting in hot weather often causes plants to bolt. In southern districts where frosts occur in spring early plants should be raised under glass or in boxes. When plants are large enough for setting out in the open care must be taken to see that they are well hardened off or their growth may be seriously retarded if a spell of cold weather is experienced following planting.

Varieties: For growing in winter especially adapted varieties such as Imperial 615 and Neapolitan (winter) are most suitable. For summer cultivation varieties such as Great Lakes and Imperial 847 are preferred, as they stand up better in warm weather.

Radish

Radishes are easy to grow, require little space, and are ready for use 3 to 6 weeks after sowing. They are adversely affected by hot, dry weather and remain in prime condition only a few days. To be mild, tender, and attractive they must be grown quickly and have plenty of moisture. Seed should be sown thinly every 3 or 4 weeks ½in. deep in rows 12in. apart in well-drained, free, deeply dug soil that contains plenty of humus.

Varieties: Of the long varieties Icicle and Long Scarlet are best. Of the turnip-shaped, round, and oval varieties the best are Red Turnip, White Turnip, and French Breakfast.

Spring Onions

Varieties of onions suitable for pulling young for salads are White Lisbon or Odourless. For best results successive sowings should be made. Sow seed ½in. deep in rows 12in. apart in a well-drained soil that has been worked down to a fine, firm tilth.

Endive

Endive, an excellent salad plant, is not grown to the extent that its usefulness justifies. It is particularly good for winter use, as it can be substituted for lettuce, which is sometimes difficult to produce in cold weather. For a winter and spring crop sow the seed as for lettuce in an outdoor seed-bed in February and March and keep it moist during dry weather. For the summer and early-autumn crop seed may be sown in September. When about 2 to 3in. high plants should be set in rows 2ft. apart with 12in. between plants in the rows. Cultivate with the hoe to keep weeds down and to loosen the soil. Endive must be grown quickly and must not receive a check or the leaves tend to develop a bitter flavour. Pick for salads or for boiling as greens any time after leaves are 4in. high; the early leaves can be cut and more allowed to grow.

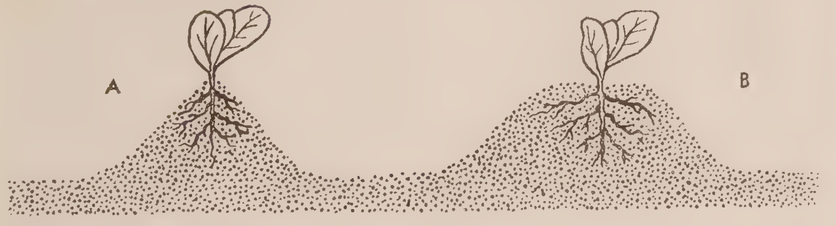
Partial blanching usually improves the flavour of the leaves and renders them more crisp and tender. Successful blanching depends on excluding the light from the inner leaves and keeping them dry. A convenient method is to gather the leaves in a bunch when the heart is nearly mature and tie them near the top; this should be done when the leaves are dry. Blanching may also be done with two boards fastened together over the row in the shape of an inverted V, or each plant may be covered with a flowerpot with the hole stopped. Blanching is completed in about 14 days, when the plant should be used as soon as possible, as it is then liable to decay.

Varieties: Commonly grown varieties are Moss Curled and Fringe Leaved, the former being the more popular.

Horse Radish

Horse radish is grown for its pungent roots, which are grated, mixed with salt and vinegar, and eaten as a relish, condiment, or appetiser with meats or other food. Though there is little choice of variety, care should be taken to obtain good healthy planting stock of a strain that is giving good results where it is to be grown. Horse radish does best on deeply worked, well-drained, well-manured loam. No fresh manure must be mixed with the surface soil, as this causes the roots to fork. Horse radish seldom develops fertile seed and therefore is propagated from roots or root cuttings, which are very hardy and persistent. If it is not treated as an annual and carefully dug up each year, it tends to spread and become a pest. Horse radish may be planted in September from root cuttings preferably 6in. long and set in rows 2ft. apart between the sets in the rows. Plant the roots in a slanting position with the thick end facing upward and the top of the cutting about 2in. below the top of the soil.

The only cultivation necessary is keeping the surface soil free of weeds and occasional hoeing to conserve soil moisture. Since horse radish makes its greatest growth late in the season, harvesting should be delayed until as late in autumn as possible. When lifted, roots may be stored in dry sand and drawn on as required.



Moulding established crops of cabbage, cauliflower, peas, and beans. A—The wrong way of drawing the soil up to plants; there is not sufficient room for root development and the soil is liable to dry out. B—Correct method of moulding. The wide flat-topped ridge can take in and retain moisture and there is ample room for roots to develop.

Seed Drills

Apart from wooden markers the most convenient tools for making the seed drills are the ordinary swan-necked hoe and garden rake. For forming a shallow drill the rake should be turned teeth uppermost and held at an angle of about 45 degrees and the back pressed into the soil to the desired depth. By moving the rake and keeping it parallel with the garden line and repeating this operation the entire drill is formed. In drawing the drill out with the hoe the blade should be tilted on its edge and only the corner used. By using short frequently repeated strokes the drill can be drawn straighter and a more regular depth kept than if long continuous strokes are used. The maintenance of correct even depth is important because variations are likely to cause irregularity or failure of germination, which will make thinning more difficult or cause blank spaces in the rows.

Spacing and Marking Rows

Various methods can be used for spacing rows. Some gardeners have the rake or hoe handle marked into 6in. spaces, which is quite a good method, but a 6 to 10ft. length of 1½in. x 1in. or similar light batten marked at the desired intervals or having 6in. spacings painted on it will be found very useful both for marking off the distance between the rows and the distance between the plants in the row. A good-quality garden line is essential and should be affixed to 12 to 15in. long pegs sharpened at one end.

Seed Sowing

Good seed is essential to success in vegetable growing. The most careful and efficient gardener cannot achieve success with poor seed even if he gives the closest attention to other factors of production.

> **As the seed is the basis of the crop and its cost is of little consequence in the total cost of production of most vegetable crops, the grower cannot afford to take chances. Only the best seeds or plants obtainable should be used.**

Quantity of seed to sow: The rate of sowing should be just sufficient to produce a uniform stand without overcrowding the plants and so necessitating undue thinning. In estimating the rate of sowing it is necessary to take into account several factors.

1. The date of sowing; the earlier sowing is done the greater the quantity of seed needed, because some of the seed will probably not germinate.

2. The physical character of the soil. Clayey soils require more seed than sandy loams, as the seedling is often injured when breaking through heavy, sticky, or lumpy ground; carrot, parsnip, and bean seedlings are especially liable to injury.

3. The size and vigour of the young plants; carrot and parsnip seedlings are weak and are not able to push through a compact, heavy soil.

4. The viability of the seed; the proportion of seed in a packet that will germinate may be ascertained by testing the seeds.

5. Insect pests, birds, and diseases; if insects and diseases are prevalent, more seed will be required. Even if seedlings are sprayed or protected from birds, some are sure to be lost.

6. Manner of sowing seed; if a crop is to mature where it is sown, seed should be used sparingly and the plants thinned to the required distance after germination. If plants are to be shifted, thicker sowing may be practised.

Sowing broadcast and in drills: Seed may be broadcast, that is, scattered evenly over a surface, or it may be distributed in straight and evenly spaced furrows or drills. Though broadcasting is quicker, the method is seldom advisable unless the soil is in exceptionally fine condition and free of weed seed. The advantages of the drill system over broadcasting are as follows:—

The seed may be sown at a uniform depth.

Seedlings grown in drills are easier to thin and weed.

It is possible to cultivate the soil, as there is a regular and definite space between plants.

Depth of sowing: Depth of sowing depends upon at least four factors, of which the first is size. The larger the seed, the deeper it should be planted. Beans may be planted to a depth of 1in. or 1½in.; celery or carrot seed should be barely covered. The texture of the soil is the second factor. If the soil is sandy, the seed may be planted at a greater depth than if the soil is clayey. The third factor is moisture. Seed must be sown deeper in dry soil than in moist or well-irrigated soil. The fourth factor, the season of the year, influences the third. There is more moisture in early spring and late autumn than in summer. Seed sown in spring and autumn should be nearer the surface than seed sown in summer, because lack of moisture in the topsoil makes deeper planting necessary.

Covering the seed: Experience has shown that the soil used to cover the seed should be as fine as possible and of free-running texture and should be firmly pressed down. It is often advisable to sieve some suitable soil when covering fine seeds. Very light soils should be firmed with even foot pressure, but the back of the rake is usually sufficient for heavy soils. Firming the soil is a most important operation for securing good germination, particularly of fine seeds.

Effect of Removal of Runners from Strawberry Plants

THE benefits to be derived from the elimination of runners from a strawberry bed intended for fruit production have often been stressed. This article by A. H. Eddie, Orchard Instructor, Department of Agriculture, Motueka, and the accompanying illustrations offer a striking example which should emphasise to growers the value of this practice.

IF runner production is required from strawberries, fruiting should be suppressed so that the energies of the plants will not be divided. For the same reason if fruit is the objective, the elimination of runners is most important, especially in the first season, when maximum crown development of the plants is necessary to ensure the production of berries in quantity in the following season.

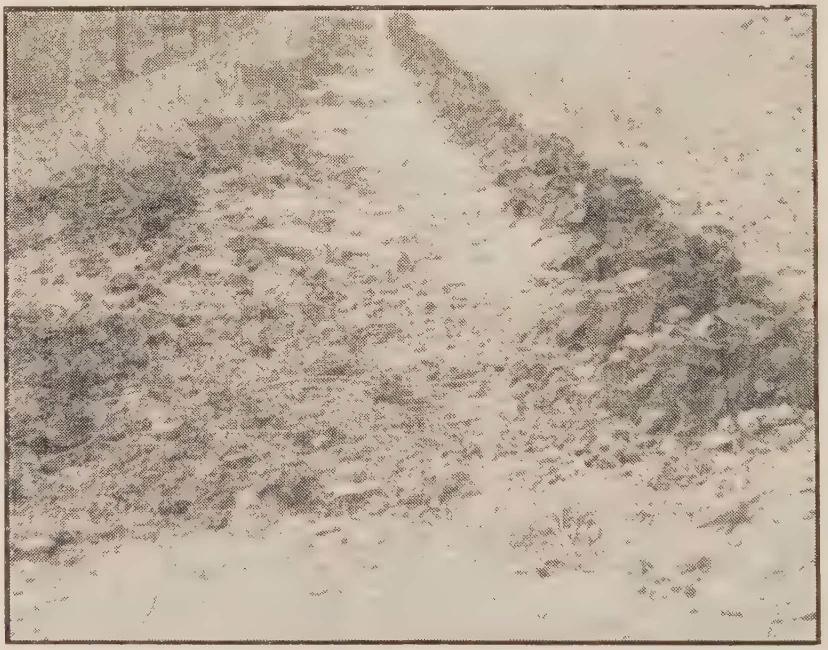
An example of this latter point occurred on the property of Mr. B. McBrydie, of Lower Moutere, where a trial plot of virus-free plants was established. The soil type is Moutere clay loam and the strawberry variety is Huxley, the plants having been raised at the Department of Agriculture's Horticultural Research Station, Levin.

Two rows of 50 plants were set out in July, which is rather late for best results in this district. Manurial treatment was similar for both rows, but one row was deblossomed and left to produce runners without restriction, while the other was allowed to flower and fruit, but runners were periodically eliminated as they appeared.

Eight months after planting the accompanying photographs were taken. They illustrate clearly the considerable difference between the two rows. The marked advantage in crown development and the consequent promise of fruiting capability for the next season gained by the de-runnered row over that allowed to produce runners are most significant. The photograph of a single plant typical of the de-runnered row further emphasises this.

[J. R. Sharp photo.

A typical plant of the de-runnered row. Note the width of the leaves and the splendid establishment of the plant, which has a diameter of more than 23in.



[J. R. Sharp photo.

The trial plot of Huxley strawberries. On the left is the row which was deblossomed but where runner production was unrestricted; at right is the row which was allowed to fruit, and in which runners were eliminated.

BOOK REVIEW: "FARMING IN NEW ZEALAND"

Valuable Documentation of Primary Industry

Reviewed by Mr. W. N. Perry, President, Federated Farmers of New Zealand

PROBABLY because their achievements are unspectacular and the evidence is difficult to document, the great farmers of the world have received scant recognition from historians. Signal work done by British livestock breeders and agronomists during the 18th and early 19th century went almost unheralded, and the remarkable contribution made by British farmers generally in better usage of land has received little recognition. It is unfortunately true that the greatest of them is less well known than contemporaries who were secondary figures in political, military, and other spheres. And though New Zealand's chief claim to distinction lies in her exceedingly efficient use of her farming lands, the record of achievement in that field has been dealt with only in piecemeal fashion. To expand the history a great deal of research and a pooling of contributions from experts in many fields is necessary. That the Department of Agriculture has undertaken this work is most gratifying. The result is the first volume of "Farming in New Zealand."

[S. P. Andrew Ltd. photo.

Mr. W. N. Perry.

IN producing this well-illustrated book the Department has taken a step which was long overdue. It is well that the work has been undertaken before some of the early history becomes obscure and before the first-hand knowledge of men who had much to do with the accelerated development of the last half century is no longer available.

"Farming in New Zealand" is a not too technical history of our agriculture from the first days of European settlement and it should prove equally as interesting to the working farmer as to the student or the economist. It deals with all the main phases of the development of the various types of farming land and the ways in which an industry has been geared deliberately to meet the exacting demands of a principal market 12,000 miles away.

Though the farmer's chief preoccupation is with the day-to-day management of his land and stock, experience has taught him that he must be informed on changing conditions. Organisations such as Federated Farmers of New Zealand have assisted the primary producer to broaden his sphere of activity and to influence the forces which affect his immediate livelihood and conditions within the industry as a whole. Farmers have always recognised the value of the work done at research establishments, and their outstanding success in the production of meat, wool, and dairy produce has in part been due to their willingness to accept technical assistance and to the practical approach of research workers to farm problems.

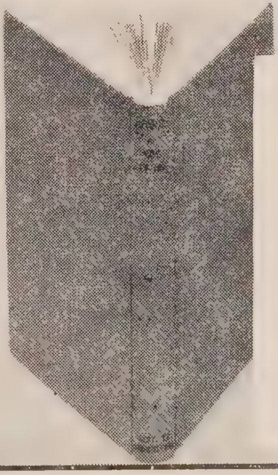
Two notable contributors to volume 1 of "Farming in New Zealand" are P. W. Smallfield, Director of the Extension Division of the Department of Agriculture, and S. H. Saxby, Agrostologist of the Department. The sound practical knowledge and the outstanding contributions made by these officers in guiding farming technique are well known. The several other contributors to the book are recognised authorities in their respective spheres.

A study of this type would be incomplete without detailed statistical information and there is a wealth of data in the volume. In fact, on this score alone it is a handy reference work.

As a chronicle of New Zealand's agricultural progress of interest to the general reader the book can be highly recommended. Its value will undoubtedly increase with the years and this permanent record of the Dominion's principal industry may well be most appreciated in the future by historians of our agricultural development.

I would recommend this book, too, to the student of our history. The tending of land, livestock, and crops has figured so prominently in the lives of New Zealanders—and will continue to do so despite the growth of secondary industries—that no useful study of events of the past 100 years can ignore the rise of our great farming industry. And it is by no means a dull page of our history; the record shows a host of difficulties surmounted, courage in accepting risks inevitably associated with radical change, and the building up of a reputation for products unsurpassed in the world's markets.

Most New Zealanders know something of the story; many have been authors of it, but it is important that the facts should be set down. That is what has been attempted in volume 1 of "Farming in New Zealand", and it is to the credit of the Department of Agriculture that it should have added this work to its already useful endeavours in the publication field.



"Farming in New Zealand"
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PRIMARY PRODUCTION MONTHLY REVIEW

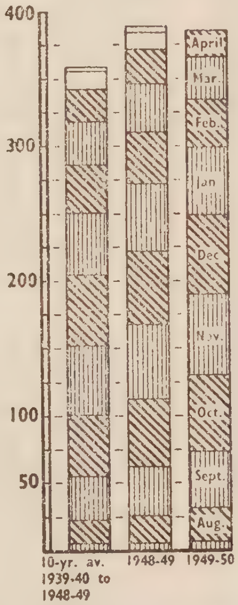
From data supplied by the Statistical Section, Extension Division, Department of Agriculture, Wellington

DAIRY PRODUCE (FACTORY PRODUCTION ONLY)

Season July 1 to June 30: Order of months July to June reading upward in each column

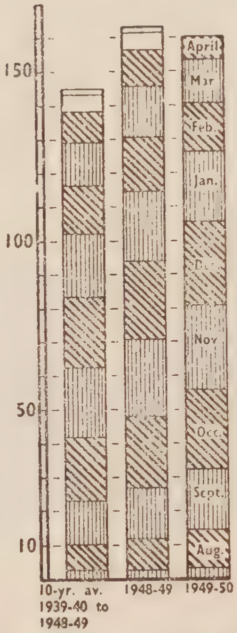
BUTTERFAT USED FOR BUTTER AND CHEESE

Millions of pounds



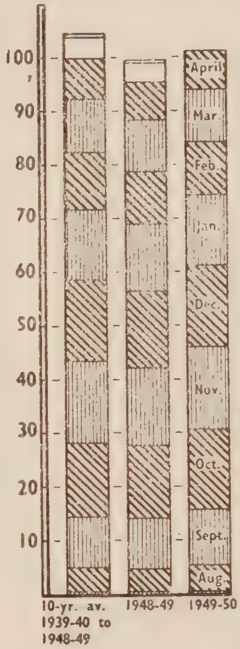
CREAMERY BUTTER

Thousands of tons



CHEESE

Thousands of tons

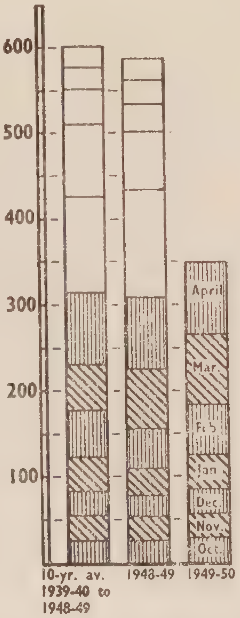


LIVESTOCK SLAUGHTERED AT MEAT EXPORT WORKS AND ABATTOIRS

Season Oct. 1 to Sept. 30: Order of months October to September reading upward in each column

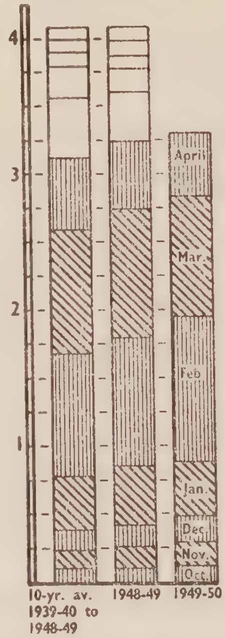
CATTLE

Thousands of carcasses



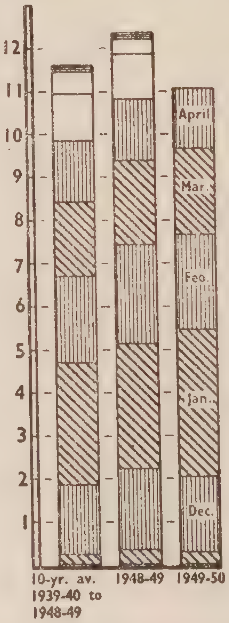
SHEEP

Millions of carcasses



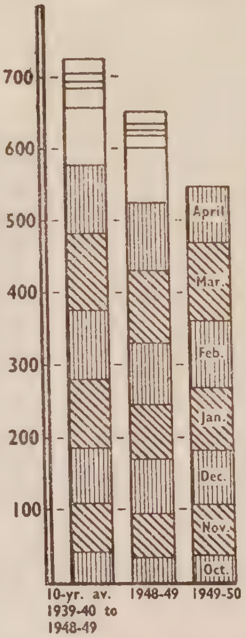
LAMBS

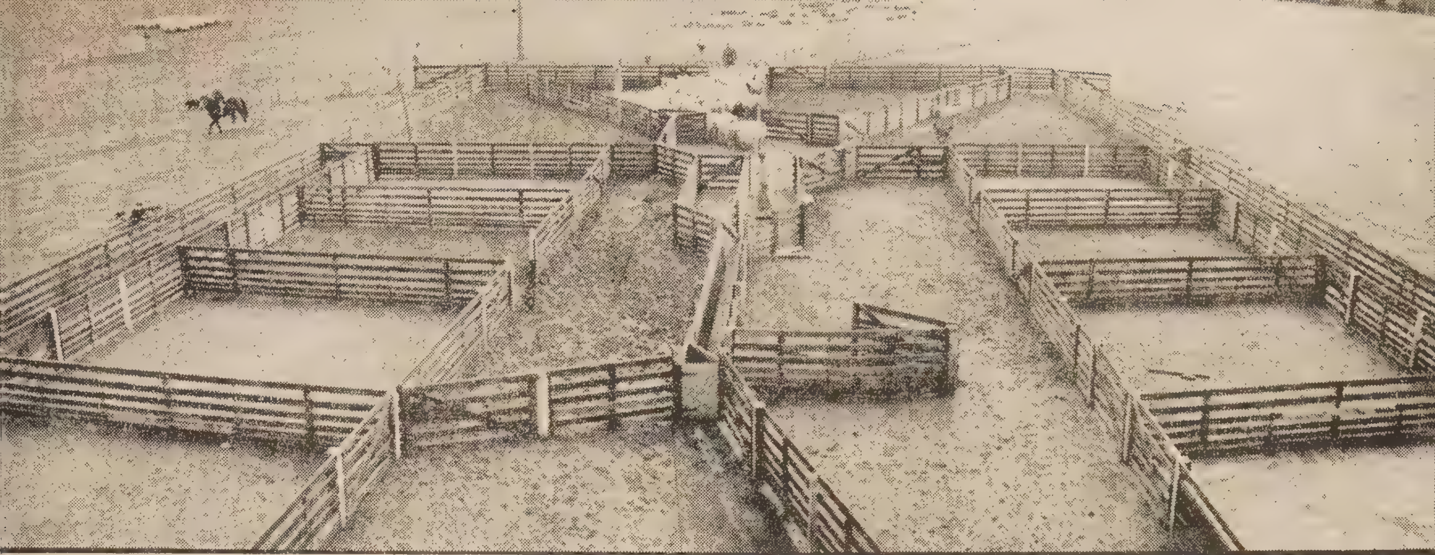
Millions of carcasses



PIGS

Thousands of carcasses





Design and Construction of Sheep-drafting Yards

By J. E. DUNCAN, Wool Supervisor, Department of Agriculture, Wellington.

THE use of concrete in the construction of sheep-drafting yards and the types of gates and races which may be employed are among the subjects dealt with in this, the second part of an article on sheep-drafting yards. The first part appeared in the July "Journal", and the final portion will appear in next month's issue.

CONCRETE fence posts and strainers have not yet been as widely used as their merits deserve. At present there is great scope for their use, and as the supplies of good durable timber decrease still further that scope will widen. Many still avoid them, because they have had, or have heard of, failures with such posts. When concrete posts crack through, the most probable cause is that the concrete has not been mixed properly in the first place, that the posts have not been allowed time to mature, or that the reinforcing has been wrongly placed.

Some farmers believe that a single ¾in. rod through the middle of the post is as good as a ¼in. rod in each corner. This is a fallacy.

Concrete has very great compressive strength, but will stand very little tensile stress. Steel reinforcing, which has a high tensile strength, is put in to overcome this weakness. The reinforcing should therefore always be in that part of the concrete likely to be subject to tensile stress. A post is liable to be pushed or pulled in any direction.

In Fig. 7 on page 131 the direction of the force applied to the posts is represented by arrows. The shaded sides of the posts are under compression, while the unshaded half is under tension. Post A, which is reinforced with a single thick steel bar, tends to crack off at or near ground level (C). The crack can go half way through the post before it meets with the resistance of the steel, which can quite easily become bent, allowing the crack to go right through. With post B, which is reinforced with a much lighter rod in each corner, the tensile strain, from whatever direction it is applied, is always offset by a steel rod just below the surface, and cracks do not develop. The steel must, however, be covered with ¾in. of concrete to prevent its rusting, and the covering of concrete should be thicker at the top of the post to allow for weathering.

Advantages and Disadvantages

The value of concrete posts may be assessed from the following list of their advantages and disadvantages.

Advantages

1. Where suitable supplies of sand and shingle are available they are cheap to construct.
2. Skilled labour is not required to make them. Post construction provides useful and profitable employment for the farm staff during wet weather when they might otherwise be idle.
3. When properly made they are strong and practically everlasting. There are no upkeep costs and as posts get older they get stronger. This applies to no other type.
4. They are not destroyed by fire or the ravages of pests.
5. Large gateposts, etc., can be made of any desired shape for special jobs and can be cast directly on the site. Details relating to aggregates, types of moulds, etc., and to other constructional points connected with the use of concrete were dealt with in a series of articles by H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, which appeared in the "Journal" in successive issues from November, 1949, to March, 1950. Technical literature is also available from cement companies.

Disadvantages

1. Their cost becomes prohibitive if material for making them has to be carted a long way.
2. They are heavy, so that with large strainers and gateposts transport may present difficulties, especially on hill country where they will have to be packed on horseback. However, ordinary posts are not too heavy for a man to carry.
3. They have to be allowed to mature before use, which takes time. (This is not always a disadvantage.)
4. Cement is still in short supply, but it is hoped this is only a passing phase.

In Fig. 8 on page 131 are given two of several alternative methods of attaching wires to concrete posts.

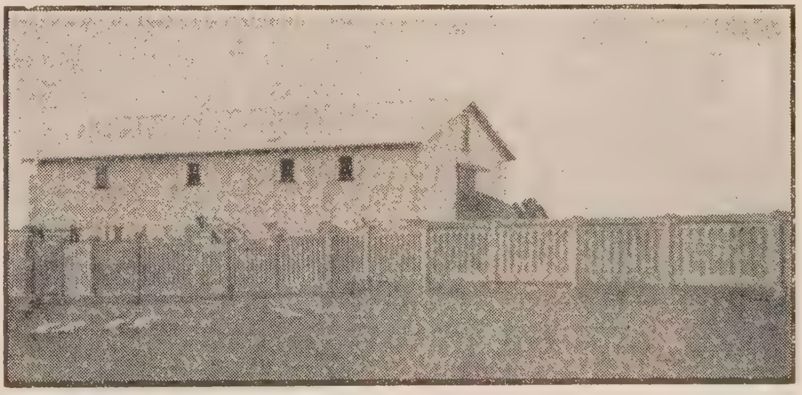


Fig. 6—An all-concrete fence is permanent and upkeep is low.

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Concrete and Pipes

Concrete posts used in conjunction with galvanised-steel pipes, though costly, make the strongest and most permanent type of fence. Such fences are sometimes used in Australian sheepyards where presumably other methods of construction would also be costly. Advantages of concrete post and pipe construction are that sheep are less likely to be bruised and that where there is an outbreak of blood poisoning the fences are very easy to disinfect thoroughly. They would also be fireproof and insect-proof. Similar remarks apply to the all-concrete fence built with concrete posts and reinforced, pre-cast concrete panels.

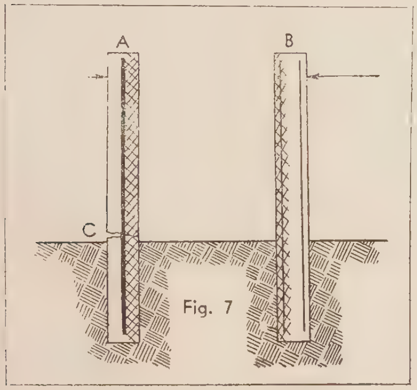


Fig. 7

Concrete Posts and Wooden Rails

Concrete post and wooden rail construction is frequently used and many expedients for attaching the rails to the posts are found. These include tying with wire through holes in the post, nailing to a batten which is bolted to the post, bolting the rails directly to the post, nailing to a wooden strip which is placed in the mould when the post is being cast, and many other more or less ingenious methods. Fig. 9 illustrates one such method, where the posts have grooves cast in their sides into which the ends of the rails are fitted. Rails are kept at the correct spacing by being nailed to a batten.

Height of Fences

Height of fences may vary considerably. Provided a fence is high enough to keep in any sheep ever likely to be in the yards, it can be considered satisfactory. Sheep vary greatly in type and temperament. A wild Merino or a crossbred from the backblocks can jump like an antelope; a stud Southdown is its antithesis. As always, cost comes into the question. In the quest for economy it is possible to cut down the safety margin of height, but it is also possible to overdo the cutting down.

Again, with the yards on the flat, fences can be lower than where they are on a steep slope and a sheep can get a good take-off when jumping.

The external or "boundary" fence of the yards can be up to 4ft. or even 5ft. high. On the other hand the fences of the crush pens and other small pens do not need to be so high, because the sheep cannot get a run at them to jump, and because if they are higher than about 3ft. 3in. they are more difficult for men and dogs to get over.

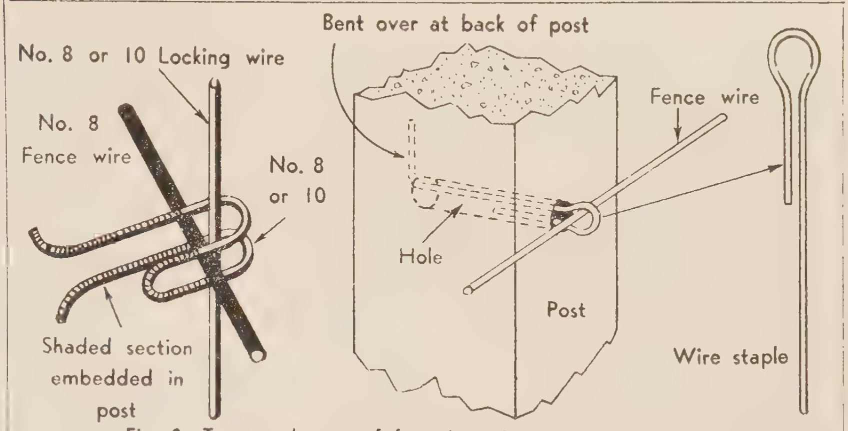


Fig. 8—Two good ways of fastening wires to concrete posts.

The height of a gate should be in keeping with the height of the fence in which it is placed.

GATES

Several types of gates are used in yards. They may be classified under five main headings:—

1. The ordinary swing gate.
2. Lift-up gates.
3. Slide-back gates.
4. Tip-up gates.
5. "Freak" or unusual gates.

The above types will be dealt with individually later in this article, but the following points apply to gates generally. It is an advantage, though of course more costly, to have gates bolted together rather than nailed, as this not only gives a stronger gate, but if the gate is smashed at any time, it is much simpler to replace the broken members.

In building gates the ordinary carriage bolt with a small square section below the rounded head should not be used, as when the thread gets rusty the square shoulder is quite insufficient to prevent the bolt from turning when an attempt is made to unscrew the nut. Use either square- or hexagon-head bolts.

Bolts and nuts should be well painted or they will soon rust away. Modern steels are not nearly so resistant to rust as the old-fashioned wrought iron. The painting or creosoting of gates is worth while, but even if they are not done all over, the joints at least should be done before assembly, as these are the first parts to rot if untreated.

The width of a gate is of course governed by the nature of the traffic it will have to handle. It is an advantage in many cases to be able to take a dray or a motor-truck into yards for carting in posts or clay or metal for the gateways, etc. The gates should be wide enough to allow passage of any such vehicles. Usually 10ft. gates should be ample for normal requirements.

Wherever possible avoid hanging gates from strainer-posts, since there is then an increased chance of the gate getting out of plumb. Separate gateposts should be used. However, in yards where post-and-rail fences are used, the gatepost can also serve as a fence post, because there is no strain on it as in a wire fence. In the case of gateways used frequently by vehicles it is a good policy to put in short, sturdy guide posts on the inside of the gateposts to protect them and prevent them from being knocked out of plumb.

The merits and disadvantages of the five main types of gates already enumerated may be summarised as follows:—

Common Swing Gate

The common swing gate is so well known that no description is needed.

Advantages

1. It is relatively cheap and easy to construct.

2. For wide openings it is the most practical type. Where openings are very wide double swing gates can be used.

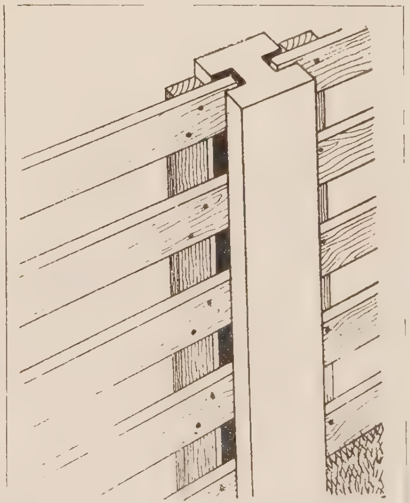
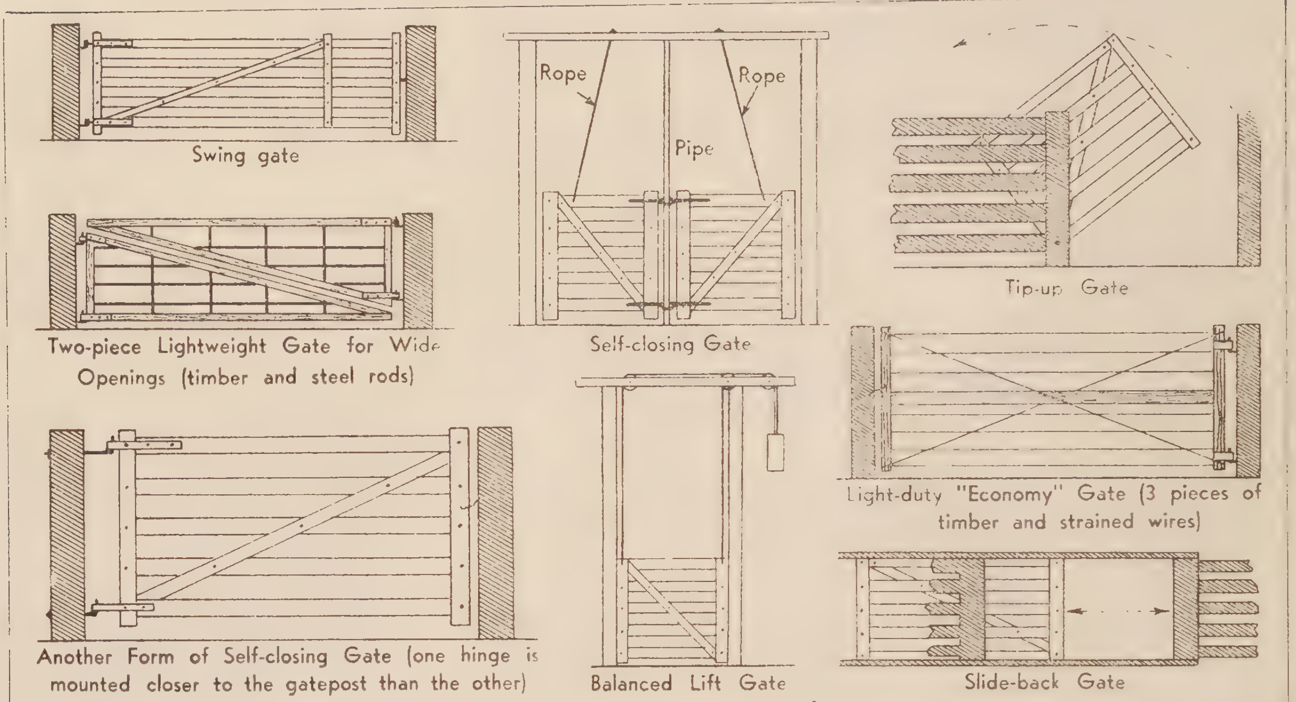


Fig. 9—One method of attaching rails to a concrete post.



Swing gate

Two-piece Lightweight Gate for Wide Openings (timber and steel rods)

Self-closing Gate

Tip-up Gate

Light-duty "Economy" Gate (3 pieces of timber and strained wires)

Another Form of Self-closing Gate (one hinge is mounted closer to the gatepost than the other)

Balanced Lift Gate

Slide-back Gate

Fig. 10—Common and uncommon types of gates.

3. As there is not much to get out of order, maintenance is low.

4. It can be quickly taken off its hinges and used as a hurdle where necessary.

5. Two of these gates can be swung across and tied together to connect two pens while cutting off a third and/or fourth pen.

6. They are easy to open on horseback.

7. They provide unlimited head-room.

8. They can be used as a "sweep" to push sheep into a crush, provided care is taken to see that no undue force is used.

Disadvantages

1. Considerable space is necessary for their swing.

2. They are difficult to open or shut when animals are pressing against them.

3. They require to be fastened when shut and if left swinging in the wind may be broken.

Lift-up Gate

The lift-up gate opens by sliding up between guides fixed to uprights. In some cases a snib is used to keep the gate up when lifted, but the best type is provided with a chain or rope running over a pulley and a counterweight which just balances the weight of the gate.

Advantages

1. The gate takes up very little space laterally.

2. If properly constructed, it is very easy to work and can be opened or shut more quickly than any other type. It is not affected greatly by wind.

3. Of the types mentioned it is least likely to get jammed by sheep pressing against it.

4. It only needs to be fastened shut if it is to be left for a time, but for ordinary work is simply pulled up or down as necessary.

Disadvantages

1. It is a difficult type to construct and requires reasonably good workmanship. It also gets out of order more easily if abused than the common swing gate.

2. It is the most expensive of the common types for first cost.

3. Due to the "gallows" over this type of gate head-room is limited.

4. As well as the disadvantages enumerated above it does not possess the advantages 2, 4, 5, and 8 given for the common swing gate.

Slide-back Gate

The slide-back gate slides back from the opening it covers. The fence at this point is usually double with about a 6in. space between. The gate runs on wheels on a steel rail above and in a channel guide below, or vice versa. In a cheaper type, however, the wheels are omitted, the fence is single, and the gate is exposed on one side.

Advantages

1. It takes up very little room for working—less than any of the types mentioned.

2. When well constructed it is quick and easy to work, but is not as good as the lift-up gate in this respect.

3. When the gate slides back into a "sheath" it cannot get jammed in the open position by sheep pressing against it.

4. It does not need to be fastened shut when being left for a short time only. It is not affected by wind.

Disadvantages

1. Its construction demands skill and good workmanship, if it is to work well. It gets out of order probably more easily than any of the other types due to small stones and dirt getting in the guides and also through sheep jumping and hitting the crossbar on which it runs.

2. It is probably the next most expensive type after the lift-up gate for first cost.

3. Unless it runs back into a sheath it can be jammed open by sheep on one side and can easily become jammed in the shut position.

4. It has very limited head-room due to the crossbar. Where this is not provided the gate will have to be made longer and stiffer and will not work as easily.

5. As well as the above it does not possess the advantages 2, 3, 4, 5, 6, and 8 given for the common swing gate.

Tip-up Gate

The tip-up gate is not as common as the types already mentioned. It is usually hinged on a single bolt passing through one of the bottom corners and swings upward and backward alongside the fence.

Advantages

1. It is relatively cheap and easy to construct and will usually work fairly well even if roughly constructed.

2. It takes up less space than other gates except the slide-back type.

3. Head-room is unlimited.

4. It is easier to move the stock leaning against it than with the common swing gate or the slide-back gate.

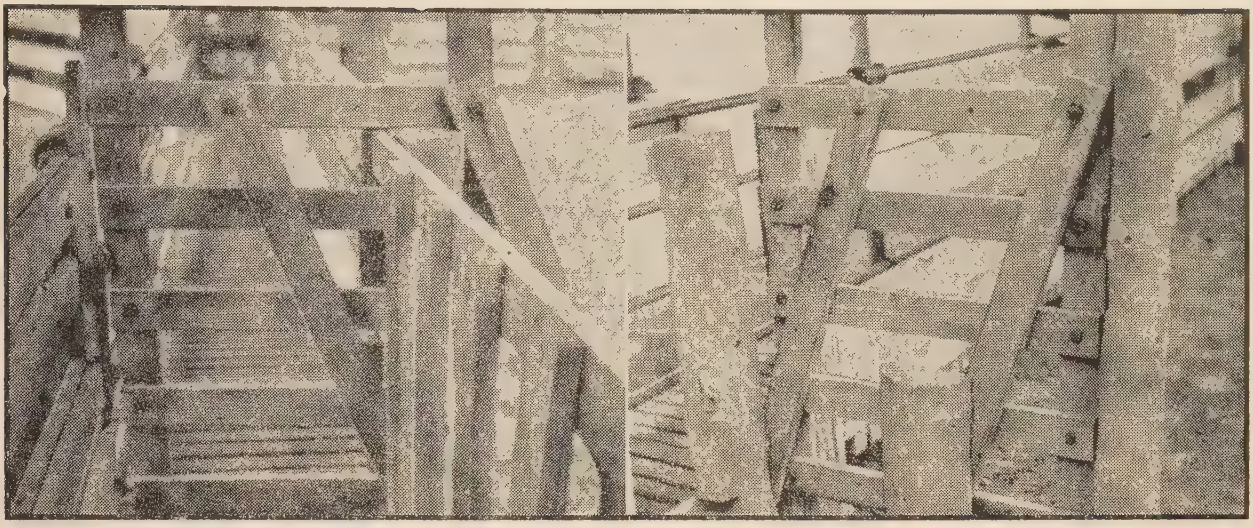


Fig. 11—"Disappearing" gate, shut (left) and open (right).

If it tips up into a sheath similar to that described for the lift-up gate, it will certainly not get jammed in the open position. It is not much affected by wind.

5. It scarcely requires a fastener, as its own weight holds it shut.

Disadvantages

1. It is cumbersome and slow to open or shut. It takes considerable manual labour, as some of the actual weight of the gate has to be lifted each time.

2. It tends to get broken, as it is hinged from one corner only.

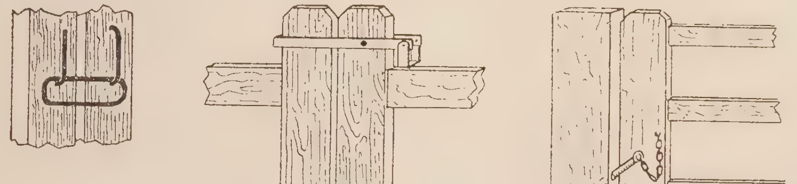


Fig. 12—Various stock-proof gate fasteners.

3. It does not possess the advantages 2, 4, 5, 6, and 8 given for the common swing gate.

"Freak" or Unusual Gates

The number of "freak" gates is legion and some display remarkable ingenuity and inventiveness. As a rule, however, they have not the all-round efficiency of the more orthodox gates, although sometimes they are specially built to function under conditions for which the usual types of gates are quite unsuited. It is not proposed to discuss any of these unusual gates in detail, but the illustrations in Fig. 10 on page 132 give a selection to choose from.

Considering all things, it seems therefore that the ordinary swing gate and the lift-up gate have the greatest number of good points. In many instances either of these could be used, but in a few cases they are not interchangeable. The swing gate certainly has a wider sphere of usefulness than any of the others, yet it is the lift-up type which figures prominently where expense is a minor consideration.

Stock-proof Fastenings

Although sheep are not as likely to undo gate fastenings as larger stock, such as cattle and horses, some of these latter are occasionally shut in different parts of a sheepyard. Some stock-proof fastenings are, therefore, shown in Fig. 12 on this page; the diagrams are largely self explanatory.

THE CRUSH

The function of the crush, which may consist of one, two, or even more separate pens, is to make it easier to force the sheep through into the race.

Shape

The pen or pens are usually not very large, holding not more than about 50 sheep altogether, and they are invariably long and narrow so that it is easy for one man to keep behind the

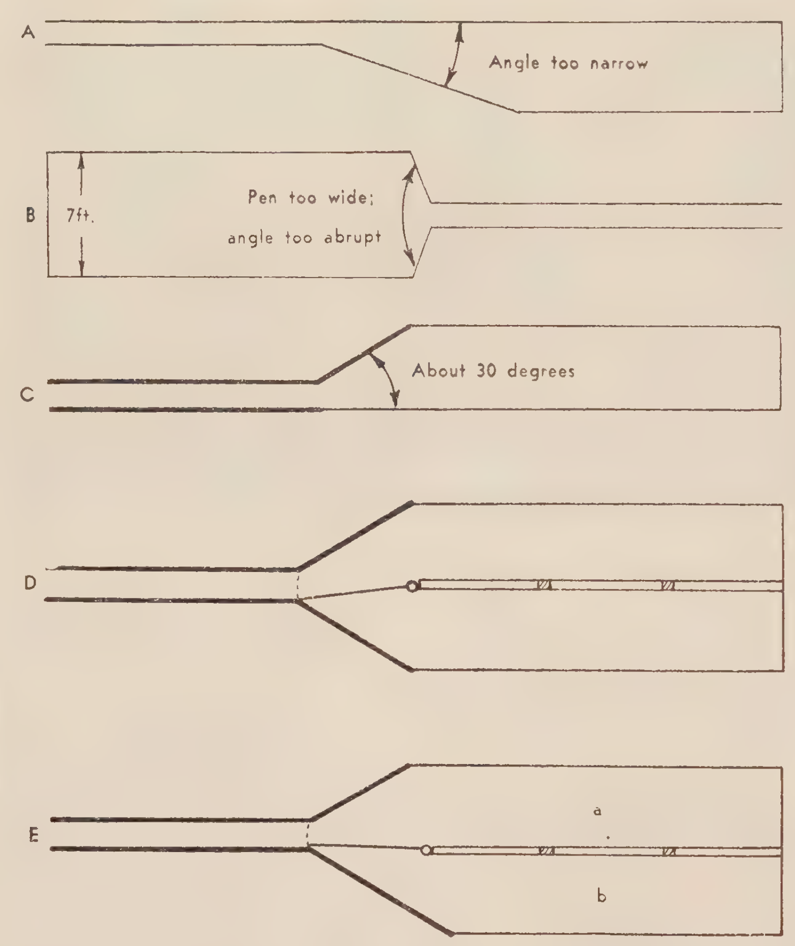


Fig. 13—Types of crush pens. Avoid A and B. For a single pen C is a good shape; it has a 30-degree angle and one fence forming a continuation of one side of the race. D is the usual type of double crush pen and has a double-railed central fence and a 2-way gate 5 or 6ft. long. E is a variation sometimes preferred; the central fence is lined up with one side of the race. Note: The sections shown by heavy lines represent parts of the fence which should be close boarded.

sheep and force them forward. The end of the crush pen should taper off into the mouth of the race. The junction between pen and race should not be an abrupt narrowing as in Fig. 13 (B) on this page or sheep will not move steadily into the race. On the other hand, a very long gradual taper as shown in Fig. 13 (A) will lead to trouble due to the tendency for the sheep to try to enter the race two abreast. Therefore an intermediate taper with an included angle of about 30 degrees should be used. Where possible one side of the crush should be straight, that is, a parallel continuation of one wall of the race in the case of a single pen (Fig. 13 (C)).

In the case of a double pen the usual arrangement is to have the dividing fence opposite the centre line of the race and to employ a fairly long gate to lead the sheep from either pen into the race. If this gate is less than about 4ft. long it will give a bad entrance —crooked and narrow. A longer gate (5 or 6ft.) will give a straighter run for the sheep. Some builders of yards deliberately line up the dividing fence with one side of the race as shown in Fig. 13 (E) on the principle that one crush pen is often used more than the other, particularly when handling small mobs, and pen a, with the straight side, is always filled first to start the sheep running well into the the race. As against this the entrance from the other pen (b) will not be as good, so personal preference and the particular circumstances of the case must decide the issue.

Size

Opinions differ as to how wide the crush pen should be, but it should never be wider than about 5ft. Even that is too wide where one man is on the job, as sheep will tend to duck back past him. For one man 3ft. 6in. is a suitable width; a crush of this width is also very useful as a dosing pen. However, it is more usual to compromise with a width of 4ft. or 4ft. 6in. Occasionally one crush pen may be made this width and the other 3ft. to 3ft. 6in. so that a choice is available for different jobs.

The reason for having two crush pens is to save time; as soon as one is emptied the other one is brought into use and there is no delay in waiting for filling. This applies particularly when picking fat lambs. The sheep in the full pen also act as a decoy to lure the second lot in. There is no particular advantage in having more than two crush pens.

The dividing fence in a double crush pen should be railed on both sides to prevent sheep, particularly fat lambs, being bruised against the posts. The height of this and the other crush-pen fences is a somewhat controversial topic; 2ft. 9in. seems to be about the minimum, though 3ft. is very common. With high-country sheep which are seldom handled or yarded it may be necessary to have higher crush-pen fences, but they should be kept as low as practicable to allow men and dogs to get over them quickly and easily.

A feature which should be included in all types of crush pens is the close boarding of the tapering section adjoining the entrance to the race. This prevents sheep seeing the man at the drafting gates or other distracting activities likely to cause them to balk before entering the race.

DRAFTING RACE

The drafting race is a most important component and a bad type of race is always a bugbear. Sheep will not work well through it and a great amount of energy, on the part of both men and dogs, is wasted through it.

There are several special types of races such as double races and races with by-passes which will be mentioned later. The simplest sort of race is merely two close-boarded wooden walls with the smooth sides facing each other. Races are always close boarded to prevent the sheep seeing anything but what is straight ahead. Width between the sides should be just sufficient to allow a sheep to walk along in comfort without being able to turn round. A single gate is hung opposite the end of the race and by swinging this gate in contact with one or other wall of the race sheep can be drafted two ways.

The dimensions of drafting races vary, and cannot be set down exactly, as they depend on so many points, such as the size of sheep to be dealt with, personal preferences, etc. The usual maximum and minimum limits for these dimensions are somewhat as follows:—

Length, 10 to 30ft. The more ways sheep are being drafted at once the longer should be the race, to give sufficient time for the hand to react to the visual message.

Width, 13 to 20in. Frequently the race is slightly wider at the top than at ground level, but this point will be dealt with later.

Height, 2ft. 9in. to 3ft. 6in., according to the type of sheep handled. This is really a compromise, since it is desirable to have the sides reasonably high to prevent the sheep passing through from seeing men and dogs near the race, while on the other hand, if the sides are too high, it is difficult to reach over and help the sheep along if a blockage occurs.

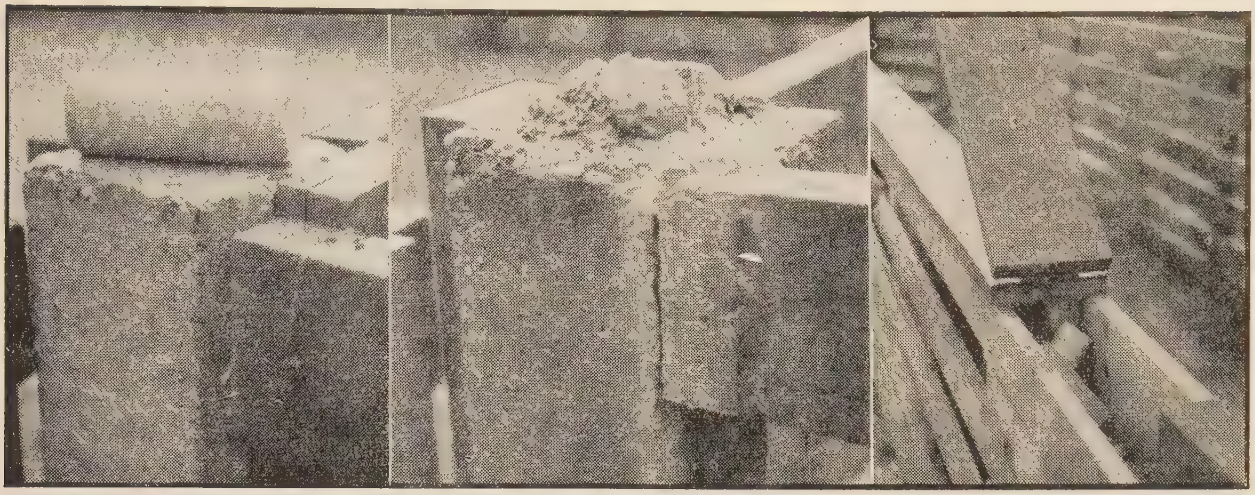


Fig. 14—Raddle exposed to the weather soon disintegrates. A simple remedy is to build a cupboard (right) into the double dividing fence of the crush pens.

It is desirable to have the floor of the race of something more durable than earth, as owing to the heavy traffic, earth very soon wears hollow. Concrete is excellent, but it must be left rough to give a good foothold. It is also a good plan to continue the concrete in a fan shape beyond the race at each end, because if it ends abruptly it leads to the earth wearing away and a sharp drop being formed. If timber is used, small hardwood cleats can be nailed across at intervals of a foot or so to prevent slipping. Cleats should not be more than ½in. high or they will do more harm than good by tripping the sheep. Whatever material is used for the floor it is a good plan to finish the boards of the race sides an inch or so above the floor, leaving a gap which lets the dirt out and helps to prevent it accumulating.

The above is a description of the race in its simplest form. The following are some modifications and refinements:—

Adjustable Races

In the case of the orthodox type of race the sides and the width between them are fixed at the time of building. The best width to use depends on the size of sheep which usually are put through the race; widths of 15 to 18in. are usual. In any case it will be somewhat of a compromise, since frequently sheep of all sizes from large rams and wethers down to lambs will be passing through it at different times and often in mixed mobs. Of course on a property running Merinos the race could be considerably narrower than where a large-framed line of Romneys were run.

The shortcomings of a race of the wrong width are obvious. If it is too narrow, the sheep will have difficulty in getting through at all, especially if carrying a heavy fleece, while if it is too wide, they will be able to turn round and there will be a strong tendency for them to try to get two abreast and so get jammed.

Worth Consideration

A race adjustable for width has, therefore, much to recommend it, provided of course that its efficiency is not sacrificed in any other way. Adjustable races have been used in Australia and Argentina and appear to have given satisfaction. Probably the reason that they have not been more widely used is that most farmers think the extra difficulty involved in construction outweighs the benefits to be derived from such a race. This is a matter for personal decision, but a few extra hours spent in building a first-class race will be repaid a hundredfold in time saved.

There are, broadly, two classes of adjustable races. The first type could be described as an elongated funnel, the neck or narrow part of which can be altered in width to suit different sizes of sheep. In other words one whole side of the race is hinged at one end and swings in or out at the other end in relation to the second fixed side of the race. This type is not particularly recommended, as there is a tendency for sheep to enter the wide end two abreast and to jam as they approach the narrow end. The second type also has one movable and one fixed side, but the movable side is hinged along the bottom, and at any given setting the sides are parallel.

The width on the floor of the race remains constant, which does not matter, since its width is ample for any sheep's feet; but higher up, opposite the spring of the animal's ribs, the width can be adjusted to suit any particular line of sheep being run through. Of course when a mixed line of sheep such as ewes and lambs is being drafted an adjustable race will not be very greatly superior to an ordinary one, but wherever large mobs of sheep have to be dealt with there will be sufficient "straight" lines of sheep to be drafted to make an adjustable race well worth while. The variation between the individual animals of any line will not be as

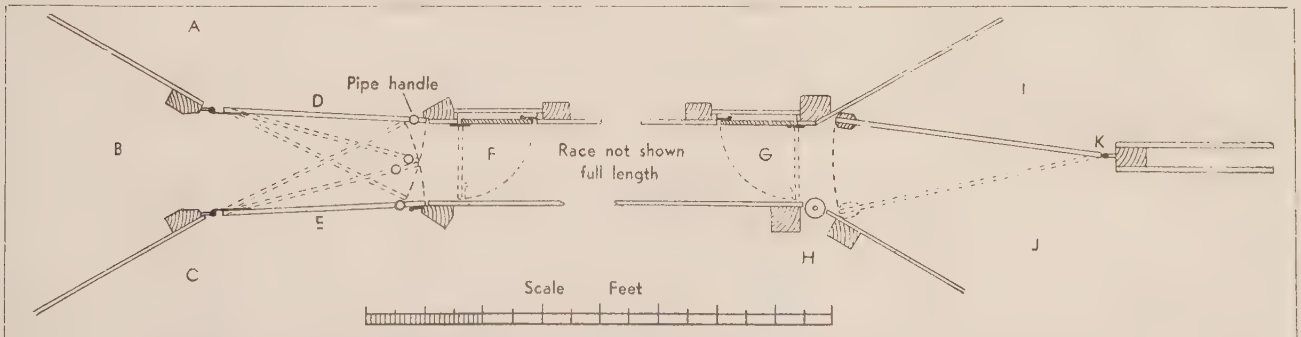


Fig. 15—3-way drafting race. A, B, C—Drafting pens. D, E—Drafting gates. F, G—Stop-gates. H—Roller. I, J—Crush pens. K—2-way gate feeding race.

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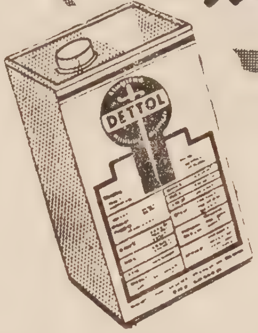

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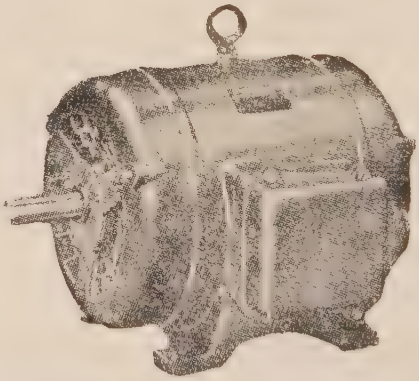

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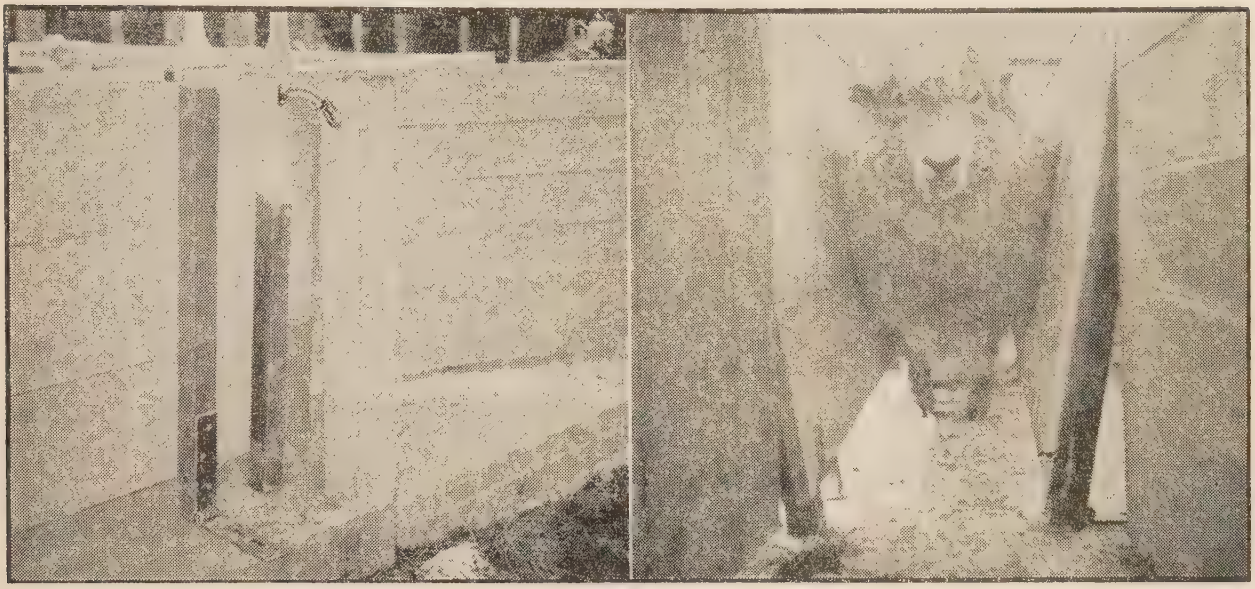

Fig. 16 (left)—An experimental race with adjustable sides. The width at top and bottom and degree of taper are all adjustable.
Fig. 17 (right)—A large Romney ram in full fleece going through the race.

great as the variation between the average sizes of any two lines, so that for each line being run through there will be a definite width of race which will give the best results. Another point to be considered is that freshly shorn sheep will need much less room than they will 12 months later with a full fleece.

A refinement which assists in getting the sheep through any race with a minimum of trouble and jamming is to have a roller 3 to 4in. in diameter at the mouth of the race; and a pair of rollers at the exit are an extra refinement which also helps. They project very little beyond the actual wall of the race and are situated right on the corners (Fig. 15, page 135). The reason for having only a single roller at the entrance is that where two sheep try to enter the race together the roller assists only one, usually enabling it to force its way through and thus prevent a bad jam.

Tapered Races

Although an adjustable race involves extra work in building, the same cannot be said of a tapered race with fixed sides, which is very little more trouble to build than the usual type and has sufficient advantages to warrant its inclusion in any set of yards.

To find the taper which would give the best results some experiments were recently carried out on a specially constructed race having both sides hinged and movable in and out. The special hinges and fasteners of this race are shown in Fig. 16 on this page. Sheep of all ages, sexes, and sizes were run through this race and numerous adjustments were tried. The experiments showed that even the largest ram required no more than 8in. width at the bottom of the race for its feet. This width was impractical, however, because it meant opening the race too wide at the top to give sufficient width half way down to allow for the spring of the animal's ribs. It was also found that a width of 11in. at the bottom and 22in. at the top (with a vertical height of 2ft. 9in.) gave the best results and accommodated the largest Romney rams and wethers carrying almost full fleeces. At the same time it was narrow enough low down to suit the hoggets as well. A tapered race built to approximately these dimensions should give general satisfaction in most parts of New Zealand.

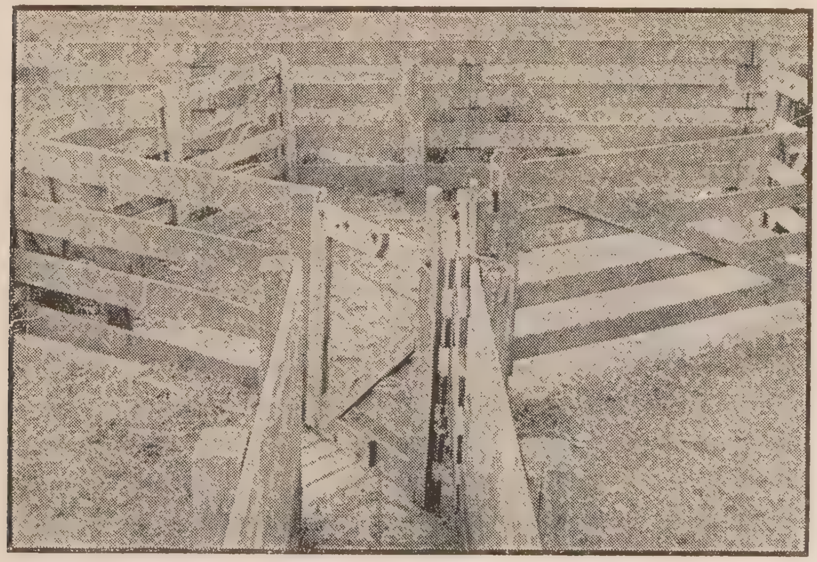

Fig. 18—The common 3-way drafting system employing 2 gates.

Curved Races

Some sheepmen maintain that sheep will run better through a curved race, where they cannot see far ahead of them, than they will through a straight race with a clear view ahead. There is still considerable controversy about this point and finality has not been reached on the question and probably will not be until someone carries out an experiment with proper controls and on a sufficiently large scale to give definite results. Where a curved race is used a straight section must be provided at the end long enough to see the sheep in time to draft them correctly.

By-pass

A by-pass consists of a passage about 3 to 5ft. wide on one side of the race and running parallel with it. One end of this by-pass communicates with the crush pen by a gate, and the other end opens into one of the check pens.

The by-pass is useful as a short cut and a more rapid means of transferring sheep than via the narrow race.

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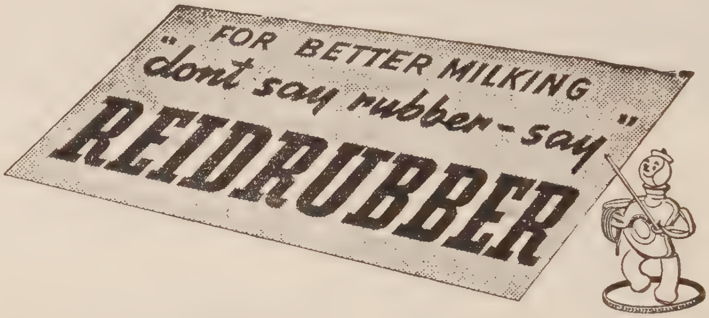

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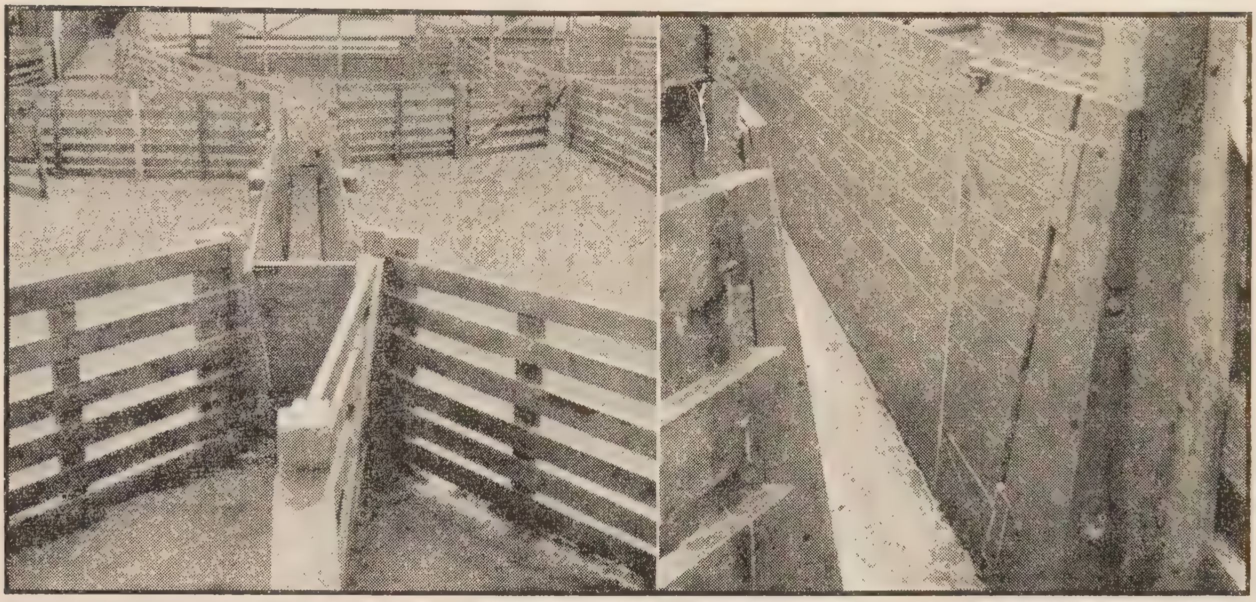


Fig. 19 (left)—Tapered race fitted with a stop-gate at either end. Fig. 20 (right)—The stop-gate is shaped and hung to suit the tapered race.

For example, it is used for filling the shed. Similarly mobs of sheep can be returned quickly by this means from the check pens to the crush for re-drafting when this is necessary.

Gate Systems for Drafting

With the simplest form of race having only a single drafting gate sheep can be drafted into two separate mobs and for a small set of yards this is usually all that is required. If the mobs require further subdivision, they are simply run through the race a second time.

The next logical step is the double drafting gate, by which sheep can be drafted three ways at once. In any but the smallest yards this is probably the most common arrangement.

Fig. 15 on page 135 is almost self explanatory, but there are one or two points which, though seemingly minor ones, contribute toward the smooth working of the race.

The small stop-gate shown at G is an improvement on the old method of using a narrow hurdle to block the race when it is not in use. It will be noted that the stop-gate must fit flush with the sides of the race when the gate is open. When closed it is secured with a bolt into the side of the race. In the case of a tapered race this gate is made accordingly—wider at the top and narrower at the bottom of the race (Figs. 19 and 20).

At times drafting gates have been made of unequal lengths so that the handles are separated by a few inches and not likely to pinch the user's fingers. The same object can be achieved equally well and with less trouble simply by having one handle at the extreme end of one gate and that on the other gate set back a few inches. Sometimes handles are omitted, but this is not a good idea, as gates are not easy to control without them. Water pipes flattened and bolted to the gates make good handles.

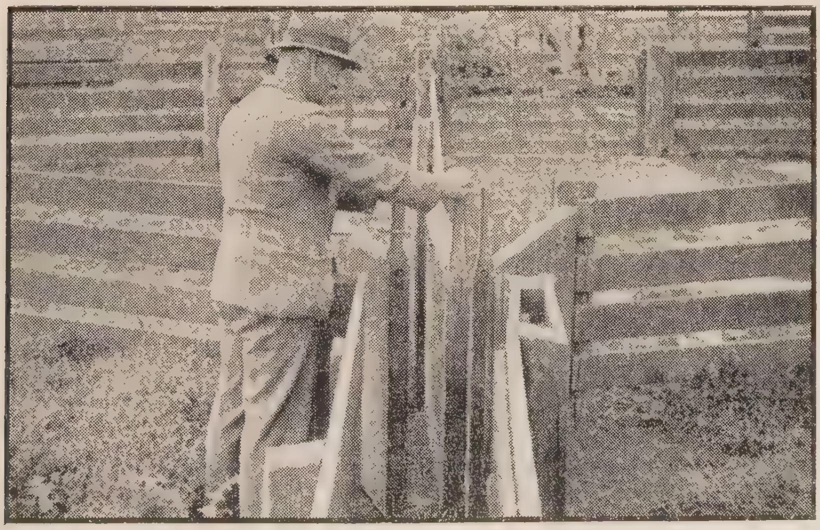


Fig. 21—Three gates are needed for 4-way drafting.

Drafting gates should always be close boarded and must swing freely on their hinges and be hung level so that they will remain in whatever position they are left, as when the operator is temporarily single handed he can then leave the gates in the proper position and go along the race to shift sheep when there is a blockage. Ample clearance must be provided between the bottom of the gate and the ground. Naturally these gates must be strong, but they must not be unduly heavy or their inertia will prevent very rapid moving, and a heavy gate will be more liable to bruise a sheep when it is swung over suddenly in an attempt to stop the animal going the wrong way. A good safeguard is to pad the leading edges of these gates with rubber from an old tyre. Drafting gates must be a reasonable length —not less than about 3ft. 6in.—or they will form a sharp angle with the wall of the race and sheep will have difficulty in getting round such a sharp bend quickly.

Nothing is worse on a drafting gate than projecting nails, nuts, or the ragged ends of bolts. These can cut and scratch nearly every sheep passing through and possibly lead to subsequent losses from blood poisoning. All bolt heads, nuts, etc., should be recessed into the wood to give a smooth, flush surface. A good drafting gate can be made on the laminated principle by nailing together two or three layers of ½in. or 7/16in. dressed planks, running one layer vertically and the other one or two layers

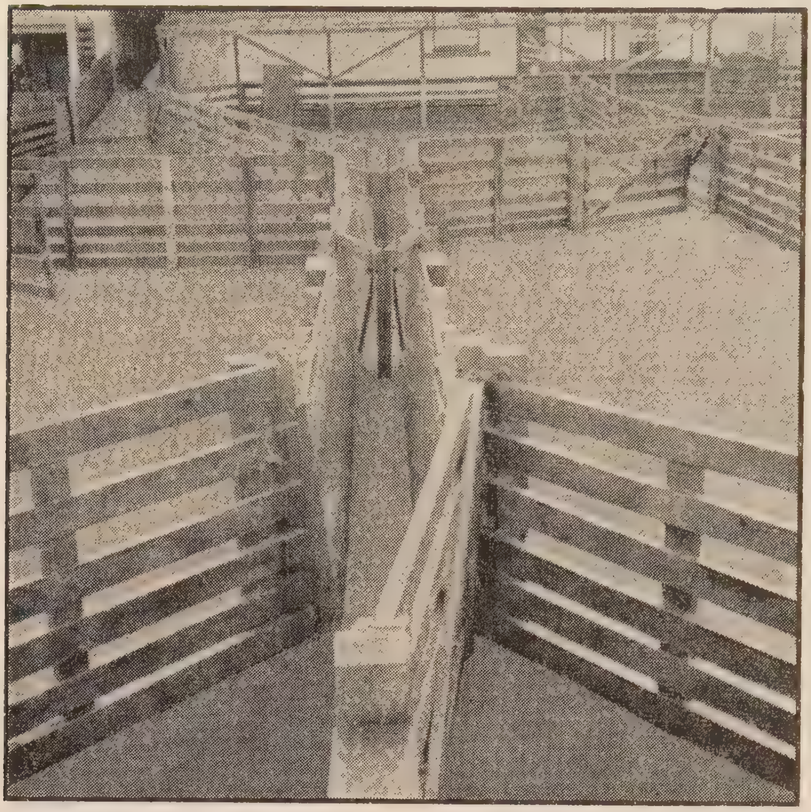


Fig. 22—Here 4 gates and 2 men working them allow 5-way drafting if necessary.

horizontally, as in plywood. This will give a light, strong, smooth gate, provided all nails are well hammered in and clinched over.

The gates D and E in Fig. 15 (page 135) should be provided with bolts or other fasteners by which they can be fixed back to the sides of the race, giving a straight run through. An additional stop-gate, fitting in flush with the boarding, can be provided at F to close off the drafting pen B, but it is not essential because when G is closed sheep in B cannot get out. Nevertheless such a gate is handy when a jam occurs and the drafter has to leave his position to rectify it. He can then close F to hold the sheep in the race until he gets back to his drafting gates.

4-, 5-, and 6-way Drafting

A number of the larger sheep stations in New Zealand are equipped with 4-way drafting races; that is, instead of the usual one or two drafting gates three are fitted, and this allows sheep to be drafted four ways. This arrangement works quite satisfactorily and at times when 4-way drafting is not required one or more of the gates may be fastened, leaving 2- or 3-way drafting with the other one or two gates in action. Attempts have been made at times to devise 5- or 6-way drafting systems, but these as a rule are not practical with only one man on the job. With a long race, however, quite a good practice is to fit two additional drafting gates about half way along; then when an extra man is available and the necessity exists sheep can be drafted two extra ways as they pass along the race. These two extra gates can be used to supplement the normal drafting gate or gates and will thus allow drafting 4, 5, or 6 ways at a time. Their inclusion also makes the yards more versatile and is worth consideration when a large new set of yards is being built. Their use is illustrated in Fig. 22.

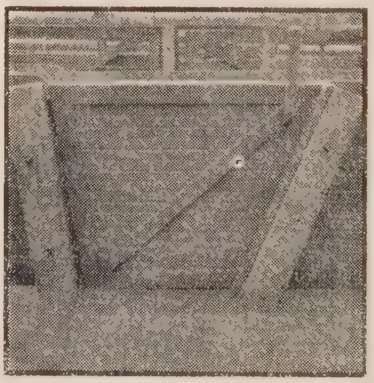


Fig. 23—When a tapered drafting race is used intermediate gates must be shaped and hung appropriately.

DRAFTING PENS

Drafting pens are sometimes omitted, or rather, where they open direct into the holding yards, they take on the functions and name of check pens. The number of drafting pens will vary according to how many ways drafting can be done. The reason for having both drafting pens and check pens is that while the sheep are issuing into the drafting pens another man can be at work on those in the check pens raddling, counting out, etc., without interference with fresh sheep continually coming in from the race. By the time he empties the check pen the drafting pen (which has the same capacity) will be full, and he lets these sheep through into the check pen, and so the process goes on.

CHECK PENS

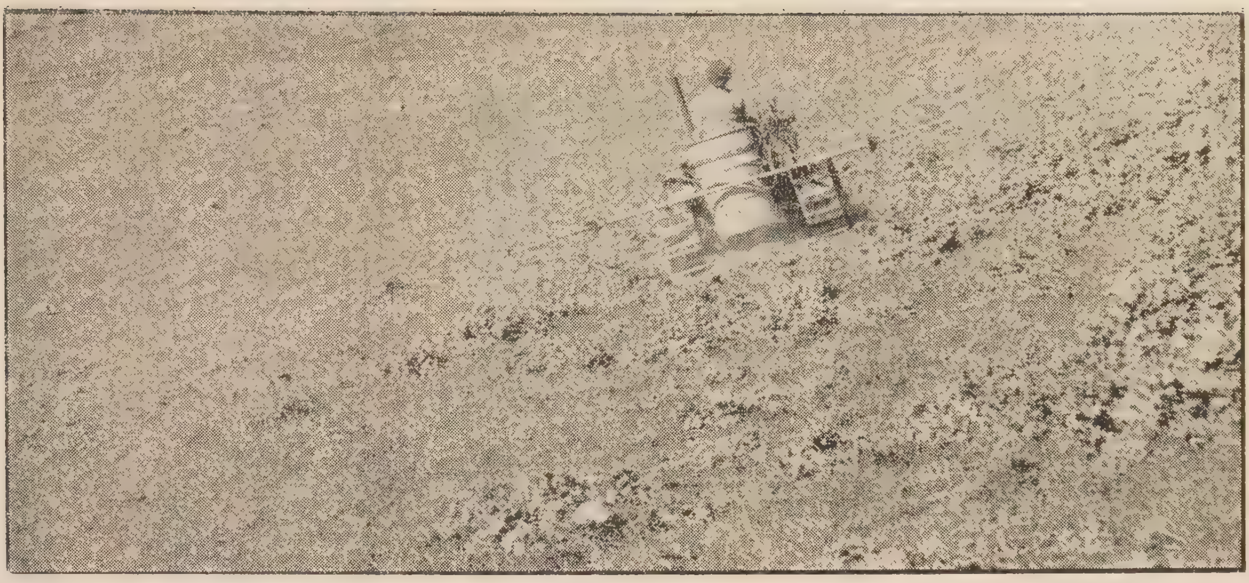
Check pens are those into which the drafted sheep issue from the drafting pens in the case of a large yard, so their number will correspond with the number of drafting pens. Check pens may be of almost any shape, but they should not be too large or it will be much more difficult to pick out sheep which have accidentally got into the wrong pens. A capacity of about 100 sheep per pen is a good upper limit to their size to facilitate catching sheep and removing them. They may be smaller than this, but if they are made too small, any gain from easier catching of sheep will be nullified by more frequent filling and emptying and the time and labour involved.

BRANDING RACE

In New Zealand a branding race is not always included in a set of yards because the counting-out pens frequently open into a narrow alleyway which serves the purpose quite well. However, branding races are sometimes installed, usually on large properties, and in such cases take the form of a long narrow race holding a number of sheep in single file. One or both sides of this race are kept low to give easy access to sheep. They are, of course, filled from a crush pen, usually triangular, which communicates with all the counting-out pens. Such races enable branding to be done quickly and neatly, but it is doubtful whether they are worth the extra expense. A branding race might, however, serve a dual purpose and have a foot-rot trough installed in the bottom of it, in which case there would be more justification for its existence. Cases are also on record of such a trough, but deeper, being used for eradicating leg lice.

If a swing gate is placed at the end of the branding race, it will then act as a drafting race and will be found very useful as an adjunct to the normal drafting race.

This concludes the description of the drafting yards. It is beyond the scope of this article to go into yard work and the actual handling of the sheep. Such a description is hardly worth while, as the finer points which simplify this part of the work can be learnt only by practical experience.



[*R. W. Orr photo.*
Variegated thistle can be effectively controlled by the use of hormone weedkillers.

Variegated Thistle and its Control

By A. R. DINGWALL, Assistant Fields Superintendent, Department of Agriculture, Christchurch.

VARIEGATED or milk thistle (*Silybum marianum*) is an annual or biennial weed occurring extensively in several North Island areas, particularly in Hawkes Bay and Wanganui (coastal) districts, and less extensively in isolated parts of the South Island. The plant forms a broad rosette of large, shining, variegated green and white leaves with thorn-tipped segments. The tall, robust, branching flower stalks, which attain a height of 7 to 8ft. on fertile soils, bear large, spiny, purple flower heads up to 3in. in diameter. The thistle grows usually in isolated but very dense communities that can completely suppress pasture species and form an almost impenetrable barrier to man and beast.

FAVOURED by free-textured, warm soils, variegated thistle gains ingress to thin, open swards on dry sunny hill slopes; to ground bared by stock camped around trees and along ridge crests; to spoil from newly excavated drains; to roadsides, stream banks, and waste places, or to ploughed or cleared ground subject to infestation from nearby established stands. With some variation due to district, location, and seasonal influences, seedlings develop strongly with February and March rains, and plants grow to moderately sized rosettes—up to 18in. in diameter—at which they remain throughout the winter. Rapid growth restarts with the advent of warmer spring weather (early September) and flower stalks begin to appear by mid-October. Flowering begins early in November and continues through December and seed is set and ripens prolifically in the new year. Spring-germinating seedlings flower and set seed later in the autumn.

Control Measures

Control measures for variegated thistle, in addition to the elimination of existing plants, must include the suppression of the crop of seedlings arising from dormant seed in the normally bare ground that remains.

Ploughing or Grubbing

Where ploughing followed by cropping or summer fallow or both and sowing down to a vigorous pasture sward are possible, control is not very difficult. Variegated thistle can prove a serious weed and will continue to propagate in summer-sown winter forage crops, especially of non-intercultivated roots. However chou moellier, rape, and greenfeed cereals—especially the last when autumn sown — have a more favourable smothering effect.

On non-ploughable hill country control is much more difficult and costly. In the past it has been largely confined to hand grubbing, usually in October, when most of the thistles are in the large rosette stage, and before the development of flower stalks. As many small rosettes are missed in grubbing and as weather conditions

Variegated thistle established on a stock camp site under a tree.

CONTROL OF VARIEGATED THISTLE

Autumn establishment of variegated thistle on land cleared of gorse.

about this time are not always favourable for successful oversowing, reinfestation quickly occurs. Consequently systematic grubbing over a period of years, often with twice-yearly grubbing (early summer and autumn), is needed to gain a reasonable measure of control. This method has become increasingly more difficult and costly with increasing shortages and costs of both permanent and casual farm labour. The 5 per cent. sodium chlorate-lime mixture, as for ragwort, has been used to some extent as a chemical control. It has not proved very satisfactory mainly because sodium chlorate is not fully effective on variegated thistle and it can also cause severe injury to any pasture species present.

Hormone Weedkillers

Trials conducted by the Department of Agriculture using hormone-type weedicides as a basis for chemical control of variegated thistle have shown promising results in comparison with hand-grubbing and sodium chlorate methods. Both 2, 4-D and M.C.P. compounds have been successfully used in both spray and powder forms, though dusting offers the more practical means of control on hill country where access and the use of large volumes of water, as in spraying, are difficult problems. Hormones can give complete kills when carefully applied and are less injurious to pasture swards than sodium chlorate, though they retard clover species for a time. Applications as low as 2½cwt. of 1 per cent. dust or 56lb. per acre of 5 per cent. dusts give satisfactory results if evenly distributed, preferably during fine weather but when foliage is damp after heavy dews or recent rain. The smaller quantity of 5 per cent. dust used can be evenly applied if bulked up to about 2cwt. per acre with lime, superphosphate, or serpentine superphosphate. Using the phosphates as the spreading agent has the added advantage of encouraging competition from pasture species without detriment to the weedicide properties of the hormones.

Time of Application

Hormone treatments should be applied in August-September and again in the following February together with surface sowing of pasture species and topdressing (if topdressing is not applied as a spreader) 4 to 6 weeks after final weed-control treatment. Where long-established, dense stands of thistles exist it may prove more advisable to give two main treatments in consecutive springs, followed by a lighter application or "spot" treatment of individual plants in the second autumn before surface sowing.

Whichever method is adopted, isolated plants will continue to appear and will have to be dealt with systematically in the rosette stage either by grubbing or "spot" treatment with hormones.

Seeds Mixture and Grazing

The surface-sown seeds mixture should contain at least 2lb. of white clover and 2lb. of subterranean clover in addition to 12 to 15lb. of perennial ryegrass, 5lb. of Italian or short-rotation ryegrass, 2lb. of crested dogstail, and 1 to 2lb. of browntop.

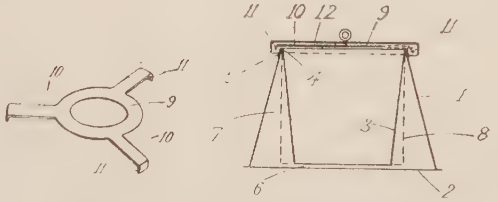
If a mob of sheep can be used to trample in the seed after sowing, so much the better. Instances have been recorded of stock poisoning where cattle have eaten variegated thistles during dry periods of feed shortage. Cattle will readily consume the wilted foliage of treated thistles and should be kept off any extensively treated area for at least 4 weeks after treatment. Treated areas should be leniently grazed throughout the period of treatment and until a reasonably dense sward has been established on affected areas.

Recent Patent Specifications for Farming Inventions

The following particulars of recent patent specifications of interest to farmers have been selected from the Patent Office Journal, issued on May 23, 1950, and are published by permission of the Commissioner of Patents, Wellington. Photostat copies of any specifications will be supplied for a small fee on application to the Patent Office.

No.	Description.	Applicant.
97293	Smoke Pot for Frost Protection,	T. A. McDowell and L. Manuel.

[Only those references which are necessary to an understanding of the specification are quoted in the abridgment below.]



An oil-burning smoke pot as used in orchards to minimise frost damage consists of a container 1, wider at the base 2 than at the mouth 5, and of a furnace portion 3 depending into container 1 so as to leave a reservoir 7 around the furnace portion which will hold a supply of oil. Furnace portion 3 does not reach right down to base 2, but leaves a space 6 free for passage of oil from the reservoir 7 into the lower part of the furnace. A damper 9 equipped with spider legs 10/11 may be carried by top rim 5 of the container, which may also be shielded against rain or extraneous matter entering the pot by a lid 12. Furnace portion 3 prevents exposure of the whole surface of burning oil, and this can be reduced further by using damper 9, thus affecting a saving of oil while at the same time obviating frequent refilling of the smoke pot during operation.

88596	Separator for Liquids,	Cherry-Burrell Corp.
93665	Cheese Treatment against Fermentation.	A. I. Virtanen and Voinvientiosuusliike Valio.
95946	Control Means for Pasteurising Apparatus,	The Aluminium Plant and Vessel Co., Ltd. and United Dairies Ltd.
97105	Seed Separating Device,	C. H. Wornall and P. A. Anderson.
97266	Cattle-feed Production,	C. W. H. Kleine and M. R. S. Kleine.
98205	Crusher for Limestone,	W. J. Taylor.
98351	Seed Dressing,	I. C. I. of Australia and New Zealand Ltd.
98437	Bulldozer Attachment for Tractor Conversion,	R. A. Gagie.
98599	Weighing Device for Seed,	A. B. Lauxein-Casco.
99145	Lawnmower Attachment for Tall Growth,	C. V. Wardrop.
99637	Rotating Water Sprayer,	Sigmund Pumps Ltd.
99638	Coupling for Water Sprinkler,	Sigmund Pumps Ltd.

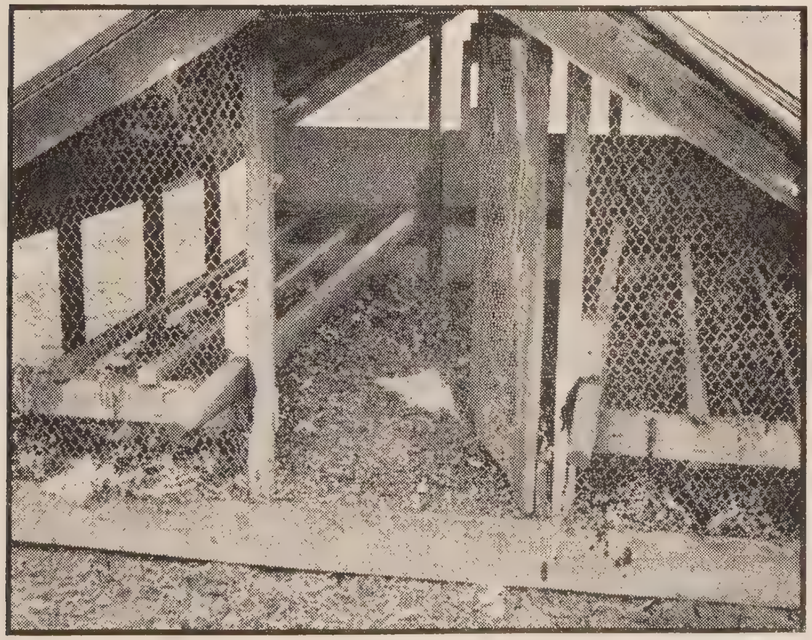
Upkeep of Housing for Domestic Poultry

ON some commercial poultry farms fowls are housed in such style that many household poultry keepers would contend the birds are given even more consideration than some farmers adopt toward the comfort and convenience of their families. Poultry kept in "sideline" lots of 200 or 300 are usually well housed, but many household units can only be classed as deplorable. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton, stresses the importance of providing comfortable housing for the birds and keeping it in repair.

[*Fraser Niederer photo.*

A single pine tree gives adequate shade for a household poultry run.

FEW backyard henhouses appear to be planned for the number of birds they ultimately hold. Perhaps a householder was unexpectedly presented with a couple of hens in the first place, but that is insufficient excuse for allowing an inadequate temporary structure to continue in use for years unaltered. Other houses perhaps were fairly well planned for 6 pullets, but are expected to accommodate 12 or more now. Some might have been ideal many years ago when built by someone who understood and liked poultry, but successive owners, who felt it a pity not to use the housing because it was there, have neglected to restore depreciated portions and to keep repairs up to date. Some poultry housing was never suitable, mainly because of poor planning, lack of knowledge of what was needed for the birds, the use of inadequate materials, bad drainage, poor ventilation, or improper siting on the section.



[*Fraser Niederer photo.*

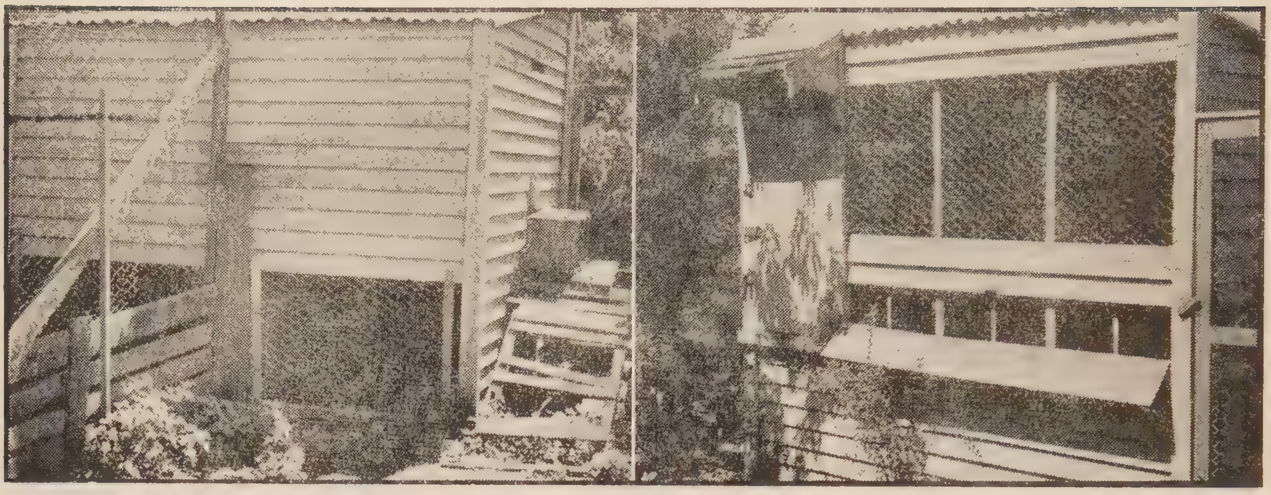
This colony house for rearing growing pullets should have been cleaned out at the end of the previous season. Even a corpse has not been removed, and the droppings should not have been allowed to rise above the netting floor.

Now is the time for the householder to take stock of his henhouse—its state of repair, its cleanliness, whether the roof is waterproof and the walls are draughtproof, the condition of perches, nests, troughs, hoppers, and droppings board, the adequacy of the floor litter, the ease with which the door can be opened and the latches operated, the state of the runs and fencing, and finally the convenience of the site.

Factors to be Considered

If the conclusion is reached that the housing does not give reasonable comfort to the fowls and is inconvenient for the person responsible for looking after them, repairs and modifications should not be delayed on the ground that the worst of the winter is past. If the house is considered past repair, a new one should be planned as quickly as possible. The most suitable situation on the section, not the poorest spot down the garden, is the correct site. On a flat section the henhouse may be built in the middle of the garden and a different quarter allocated as a run each year for 4 years, the other three quarters being cultivated under a 3-year crop-rotation system. A henhouse built with good materials will last for years and be an asset adding to the value of the property if it must be sold. The general principles of poultry keeping must be understood so that the house is built the proper size for the number of birds and provides comfort, ventilation, and convenience of feeding while reserving adequate space and suitable positions for the equipment necessary for running fowls with a minimum of labour.

Points to be borne in mind when planning poultry housing are: Separate housing for pullets and hens; ventilation without draughts; the feeding system, including provision of greenfeed; ingress of sunshine; flooring and litter; runs and shade; equipment



[*Fraser Niederer photos.*

Front and back views of the backyard henhouse referred to on this page. The high floor level is excellent in many respects, enabling the eggs to be gathered readily from outside the house, but it also has disadvantages. Proper provision was made to prevent the fowls getting underneath the house, but the entrance, staging, and ramp are in a sorry state of disrepair.

which can be cleaned readily; hoppers and drinkers; and ensuring control of red mites, lice, and ailments.

The birds may be considered to be producing quite well in their present housing, even though rain leaks through the roof, winds whistle through cracks between the boards, and the run is a sea of mud after rain and almost bare of grass at the best of times. That fowls can lay heavily even in such circumstances and the extent to which they can withstand cold and miserable conditions are remarkable, but their body heat and maintenance come first, so only the surplus food goes to produce eggs, and their digestive capacity is limited. One obvious way to improve egg production is to decrease losses of body heat and leave more of their food after body maintenance for manufacturing eggs.

Mistakes in Construction

The laying house illustrated on this page obviously was built by somebody who wanted to treat the birds well. First-class timber went into its construction and a good-sized run with trees for shade was supplied. The wooden flooring was built high above the ground, partly to permit the soil beneath to dry out quickly after rain, but mainly so that the nests would be at a convenient height for the eggs to be gathered. That could have been achieved with a lower floor level, at the same time leaving sufficient height inside for a person to stand upright instead of having to stoop to avoid hitting the head against the rafters. The worst mistake the builder made was to board in the front completely; no sunshine could enter the house when the door was closed. The present owner of the property sought advice about the housing, and the photographs were taken soon after portion of the front boards had been removed and replaced by wire netting but before the staging and ramp had been repaired. The perches and other fittings inside the house had not been made properly but could be altered easily.

The fact that a friend or neighbour has a henhouse of a certain design or adopts a special feeding system does not mean that the design is the best or that no other system is suitable. A text-book may give a house design for the average situation in New Zealand and it may be left to the common sense of the reader to realise that amendments can be made to suit other districts. For example, in the laying house illustrated the nests could be placed on a side wall and the front wire netting carried down to floor level in a warm, sheltered area protected by hedges and trees.

As important as building a henhouse properly is keeping it in repair and maintaining the equipment and fittings in working order. Doors, gates, and latches too often are left in disrepair, causing loss of time in attending to the poultry, apart from the nuisance and temper-wearing aspect of opening and shutting refractory gates. Labour is lessened if proper equipment is supplied and kept in condition. Equipment must be bought or made only once

METEOROLOGICAL RECORDS FOR JUNE

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	54.8	+ 2.9	69.0	34.3	7.46	17		1.70	25	121.9
Auckland	160	54.6	+ 1.3	66.4	38.9	7.09	19	+ 1.67	1.27	8	106.3
Tauranga	10	51.4	+ 1.7	65.0	31.0	5.69	14	+ 0.35	1.30	26	128.4
Ruakura	131	49.0	+ 1.1	64.0	24.8	5.89	16	+ 1.08	1.17	27	93.3
Rotorua	980	48.0	+ 2.2	61.0	28.0	8.37	15	+ 3.06	2.50	30	111.6
Gisborne	12	49.9	+ 0.9	68.8	29.8	4.38	15	+ 0.37	1.16	30	134.0
New Plymouth ..	160	51.6	+ 1.6	62.0	33.0	9.34	16	+ 3.24	1.72	30	114.1
Napier	5	49.7	+ 1.3	66.8	31.4	4.15	12	+ 1.11	1.23	26	145.0
Taihape	2157	43.6	+ 0.8	56.3	28.3	3.30	19	+ 0.02	0.55	27	
Wanganui	72	49.2	+ 0.9	61.9	33.0	3.80	18	+ 0.50	0.67	27	122.0
Palmerston North .	110	47.4	+ 0.7	61.0	27.6	7.20	19	+ 3.70	1.65	6	95.3
Waingawa	350	45.2	— 0.4	62.0	25.1	5.13	17	+ 1.52	1.15	26	106.0
Wellington	415	47.6	— 0.3	59.9	34.0	4.35	14	+ 0.02	1.48	27	112.2
Nelson	24	47.0	+ 0.8	63.7	30.3	1.86	14	— 1.63	0.53	2	150.7
Blenheim	12	45.6	+ 0.2	62.5	27.3	5.64	11	+ 3.23	2.17	30	161.1
Hokitika	12	44.9	+ 0.3	59.4	27.7	5.67	15	— 3.48	1.27	6	102.3
Hanmer Springs ..	1225	38.0	— 1.8	58.0	16.0	4.88	13	+ 1.43	0.96	4	94.1
Christchurch	22	42.2	— 1.0	60.7	25.9	2.86	12	+ 0.32	0.75	27	133.0
Ashburton	323	41.6	+ 0.4	60.0	22.4	2.02	9	— 0.45	0.67	27	134.3
Timaru .. .	56	42.7	+ 0.3	59.8	26.4	2.24	9	+ 0.45	0.71	27	137.2
Alexandra . ..	520	37.8	+ 0.0	54.2	19.9	0.48	9	— 0.28	0.16	29	118.3
Taieri .	80	42.0	+ 0.2	54.6	21.8	1.10	15	— 1.14	0.19	8	101.7
Invercargill	32	42.4	+ 0.2	54.0	27.0	8.20	24	+4.45	1.40	7	57.0

Pasture Management and Crop Production

SEASONAL NOTES Contributed by the EXTENSION DIVISION

IN arable farming districts many spring-sown pastures are established with a cover crop, usually by undersowing the grass mixture on land which is carrying an autumn- or winter-sown cereal. Though the best results in pasture establishment are usually obtained when grass and clover seed are sown alone in autumn after a summer fallow, this is not always possible and a portion of each year's new grass on arable farms must often be sown with a cereal.

* * *

RYEGRASS SEEDING Ryegrass is the main species affected by shading and competition of a cover crop, and where the normal seeding of ryegrass is 25 to 30lb. per acre without a cover crop, the seeding of this species should be increased to 35 to 40lb. when it is sown under a cover crop.

* * *

CLOVER BLOAT Bloat is a common hazard on dairy farms. It may occur at any time and with varying types of feed, although it is usually associated with a heavy spring clover growth. Certain feeding management methods help to reduce bloat; for example, full provision of hay and other supplementary feed in early spring so that dairy cows are not unduly hungry when grazing, the saving of late-autumn and early-winter grass for spring feeding, and the mowing and wilting of luxuriant clover before grazing it.

* * *

EARLY SPRING Pastures which have been hard grazed over the winter are usually very clovery in spring. The approved practice of saving late-autumn and early-winter growth of grass on certain fields provides early-spring feed which is dominantly grass. If this saved grass is rationed out for feeding each day in small breaks (with an electric fence) after the herd has consumed its ration of hay or silage, the incidence of bloat is usually greatly reduced.

* * *

LATE SPRING In mid- and late spring when clover and grass are making rapid growth dairy cows do not consume hay and silage readily and it is often at this period that clover bloat causes severe losses. The risk of bloat may be largely overcome if the clovery pasture growth is mown and wilted before feeding. The daily mowing of a break of clovery pasture does not take up much time and does not entail as much work as that necessary to watch the herd and attend to blown cows, which has to be done often when dairy cows are grazing clovery fields.

* * *

LINSEED PRODUCTION Linseed production could well be expanded in South Island arable districts and the crop incorporated in the regular rotation programme so that seed-bed preparation might receive the attention it deserves. In the past the crop has often been sown on land intended for some other crop which was not sown because of the lateness of the season and the linseed crop has suffered in yield accordingly. Linseed should be sown not later than the middle of October at the rate of 35 to 60lb. per acre (the smaller-seeded varieties being sown more lightly than the larger-seeded) with 1cwt. of superphosphate per acre.

* * *

[*Kingham photo.*

Linseed production could well be expanded in South Island arable farming districts.

LINSEED VARIETIES When a crop becomes as widely grown as has linseed in recent years the matter of the most suitable varieties for varying soil types and different climatic conditions becomes of extreme importance. For many years the only variety grown in New Zealand was known as "N.Z. Commercial". Though this variety has been discarded from Department of Agriculture trials, it is still being grown by some farmers. In recent years a number of new varieties have been imported mainly from the U.S.A. and India. These new varieties have undergone trials throughout the linseed-growing districts and the following notes are based on the behaviour of the varieties in those trials. The main features of a good variety are yield, freedom from disease of a serious nature, early maturity, and ease of harvesting.

Golden Viking, which usually grows 16 to 20in. high, has proved an excellent variety in all trials. It is only slightly susceptible to rust, matures fairly early, and is a satisfactory variety to harvest. Compared with other varieties its yields have been good. It is the principal variety grown in Canterbury today.

Bison is taller growing than Golden Viking and matures earlier. It is grown more extensively in Southland, because lateness of maturity is a disadvantage there. The variety is, however, susceptible to rust attack.

Walsh has been slightly more susceptible to rust and slightly later in maturing than Golden Viking in trials so far. Yields of seed generally have been below that of Golden Viking, which usually grows 2 to 3in. taller. It appears to be preferred on the lighter lands of North Canterbury.

Koto appears to be a promising variety. It is early maturing, is not susceptible to rust, and is easy to harvest. In trials it has yielded slightly less (on an average) than Golden Viking, but appreciably more than Walsh. It was tried commercially for the first time last season and sufficient seed is now available for wider sowings.

Victory is of similar height to Walsh, is not susceptible to rust, and can be harvested satisfactorily. It is a good yielding variety, but is late in maturing, which may be a disadvantage in some districts. Seed supplies of this variety are at present limited.

Cheyenne is tall growing and resistant to rust, but details of the variety are available from one trial only. It was the earliest-maturing variety in the trial, a factor which may be of great importance in a district such as Southland. Seed is now available for sowing commercial areas.

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Systems of Pig Feeding and Management in New Zealand

Home-separation Dairy Farm (Skimmed Milk)

THIS article is the first of a series by I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, dealing with the various systems of feeding and management employed in pig raising in New Zealand. It deals with the methods used on the home-separation dairy farm.

THE development of the separation of milk on the farm for butter manufacture was the starting point of widespread pig production in New Zealand. The farmer was faced with the disposal of the skimmed milk and turned to pigs as a profitable method of accomplishing it. (Pigs produce more meat from 100lb. of feed than any other animal and are the most profitable of all farm livestock.) Most of the pigs produced have always come from the dairy farmers supplying cream to butter factories. Pig production in New Zealand to date, or at least the bulk of it, has been an integral part of the dairy industry. In one respect it is unique, as in New Zealand the basic food for pigs is dairy by-products and small quantities only of meal and home-grown crops are used to supplement it.

The problem in pig production is to have on hand at the right times sufficient pigs to deal adequately with the skimmed milk available. It is complicated by the fact that pigs breed twice a year and so have two peaks of production, whereas dairy cattle have only one. The problem has been solved by careful adjustment of the farrowing dates of sows to fit in with the calving dates of the dairy herd and by producing baconers in the first half of the dairy season and porkers in the second half.

Dry sows and boar on good pasture. In-pig sows must be kept in rising condition. Note the good housing.

The dairy farmer uses two methods to obtain the necessary supply of pigs: He breeds his own or buys weaners or stores and fattens them. The former is the more satisfactory and the more profitable method and usually is adopted by farmers who desire to make the most out of pigs. The farmer who buys weaners or stores in the saleyards tends to look on pigs as a necessary evil and as a sump for the disposal of the skimmed milk, and generally he achieves the results that may be expected from such an attitude.

System of Feeding Skimmed Milk

On the bulk of home-separation dairy farms skimmed milk is pumped directly from the separator to the piggery which must, by regulation, be at least 150ft. from the milking shed. The skimmed milk is delivered by the pump into a suitable container and is put into the troughs with buckets or, on farms where a large supply is available, by a system of pipes and taps at the troughs. The usual method of keeping skimmed-milk pumps and pipelines clean is to pump a solution of molasses through them immediately after the last of the milk has gone through and then to fill the pipeline with water, which is left there until the next milking.

A line of good baconers. Litters farrowed in May are up to bacon weight before Christmas.

The most commonly used meal supplement is meat meal, a by-product of the meat works. It is very rich in protein and has proved an excellent supplement to skimmed milk during the first 4 months of the pigs' lives. After this its use is unnecessary on the home-separation farm, as pigs can be finished off satisfactorily on skimmed milk alone provided controlled access to pasture is available. The rate of feeding of meat meal does not exceed ½lb. to each pig per day. Before 1940 barley and barley meal were also used extensively as supplements, but the high cost of these grain meals at present is restricting their use. The rate of feeding is up to 1lb. to each pig per day.

The basic ration of skimmed milk is fed in the following quantities: At weaning, 2½ gallons a day to each pig, rising to 6 gallons at 5½ to 6 months old, when pigs are being finished. Experience has shown that at all times the maintenance of good health requires access to pasture, which should be of good quality, and that this access should be controlled; that is, pigs should not have unrestricted access in all weathers.

Sow's Rations

The rations to the sow before the litter is weaned (the first 8 weeks after farrowing) are based on a maintenance ration plus an allowance according to the number of pigs in the litter. In calculating this 1 gallon of skimmed milk is regarded as a food unit and the sow receives 4 units as a maintenance ration and 1 unit for each pig in the litter, but to reduce the amount of liquid that has to be consumed by the sow the quantity of meal supplement is increased to up to 1½lb. of meat meal or 2lb. of barley meal.

When litters are 3 weeks old creep feeding is begun. At first 2oz. of meat meal and not more than ½ gallon of

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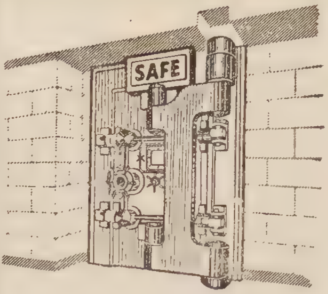

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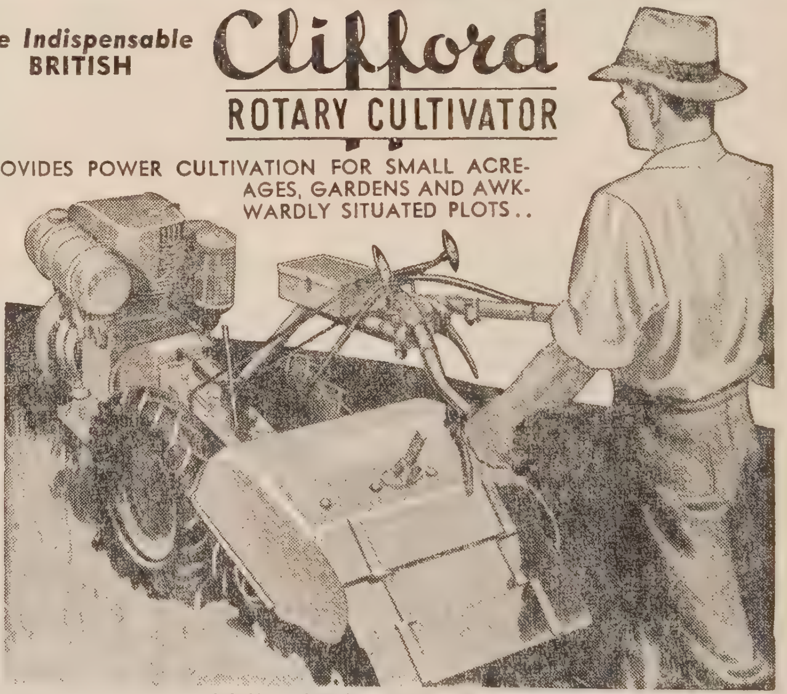

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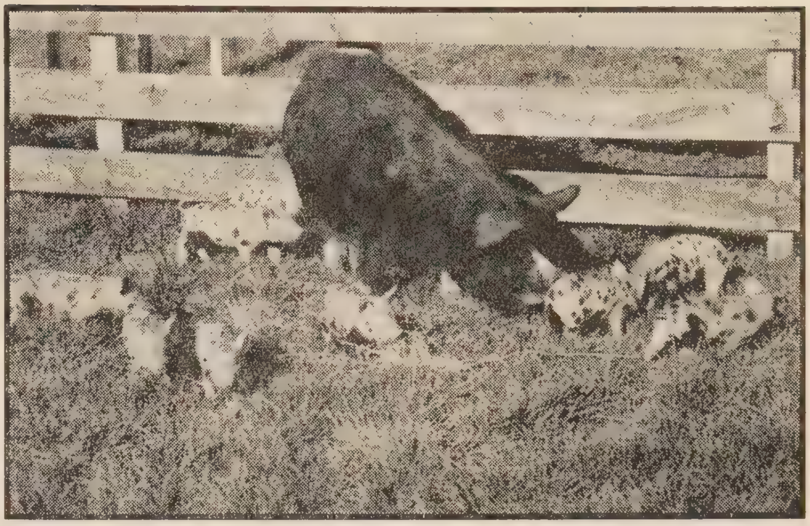
milk a day per pig is fed, but the amounts are increased gradually to 8oz. of meat meal and 2½ gallons of milk at weaning.

In-pig sows are fed a ration which is sufficient to keep them in rising condition during pregnancy. The amount depends entirely on the individual sow and is a matter for observation on the part of the farmer. In-pig sows are run out on pasture and provided with a shed to sleep in. The boar is usually run with the dry sows and kept in good condition but not too fat.



Sows and litters must have access to good pasture.

The Aim of Management

The object of management is to have sufficient pigs on hand to deal with the skimmed milk available and yet not be overstocked. This is done by adjusting farrowing dates of sows to the calving dates of the herd. Experience has shown that usually farrowing sows in May and November gives the best results on dairy farms where cows start to calve at the beginning of July.

Because pigs farrow every 6 months, it is necessary for the farmer who breeds his own pigs to carry some pigs through the winter, when cows are dry and no skimmed milk is available. To do this he must buy food for them or grow it on the farm; a combination of both is ideal. When the cows begin to calve the supply of skimmed milk rises fairly rapidly despite the fact that a quantity is used at the beginning of the season for rearing calves. There are two reasons for farrowing sows in May, 2 months before the cows calve: First, pigs farrowed in May are of sufficient size to cope with the rising supply of skimmed milk in spring; secondly, it costs less to feed a sow and litter during winter than the same number of store pigs.

Pigs Finished According to Feed Supply

May litters grow with the increasing skimmed milk supply and are finished off as baconers before Christmas. Sows farrow again in November so that the maximum number of pigs is on hand at the production peak of the dairy season. Because litters farrowed in November are faced with a falling food supply as the cows' production declines in autumn, they are disposed of mostly as porkers. The first to reach porker weights are sold at the end of February and from that time onward small batches are disposed of at frequent intervals. In this way the number of pigs on hand is kept at a level at which there is sufficient skimmed milk for them. Toward the end of the dairy season, particularly in a good autumn, some of the pigs from the November litter are taken up to baconer weights.

Some farmers who grow crops for their pigs do so not only for winter feeding but to provide food in autumn to augment the falling milk supply. The types of crops grown for pigs vary considerably in different areas according to soil and climate.

In areas where it is possible to grow a supplement such as barley, peas, or maize very little difficulty should be experienced in achieving efficient production and profitable returns.

Root crops of many varieties are grown for pigs, climate and soil conditions again being the governing factors. Sugar beet, which is being grown more widely each year, has the best food value of the root crops grown for pigs.

Effect of Distance from Markets

Though the system of management described has dealt with a combination of baconer and porker production, some farmers, particularly those whose farms are a long distance from the point at which their pigs are killed, concentrate on all-baconer production. The reason is that cartage to the killing point is usually on a per-head basis and represents a considerable portion of the cost of production. Farmers situated close to a town frequently produce porkers only, having a good market for them close at hand. Again, others who are near a saleyard where there is a good market for weaners specialise in this type of pig production, satisfying the demand of the farmer who cannot or will not breed his own pigs.

The sow-cow ratio varies with the type of production. For baconer production only, it is 1 sow to each 12 to 14 cows, for baconer and porker production, 1 sow to each 10 to 12 cows, for porker production only, 1 sow to each 8 to 10 cows, and for weaner production 1 sow to each 5 to 7 cows. These can be taken as average figures and vary slightly with local conditions.

Sugar beet is the most valuable root crop that can be grown for pigs.

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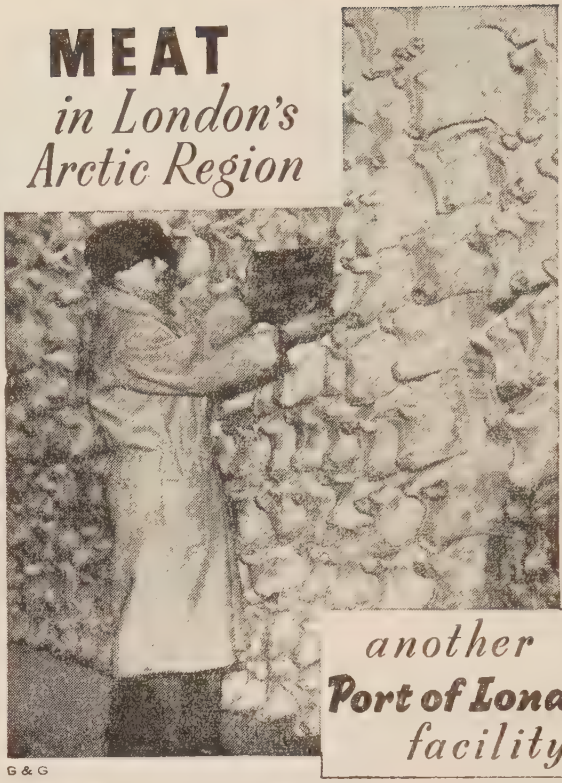

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Crop and Pasture Competitions, 1949

Contributed by the Extension Division.

CROP and pasture competitions are conducted in a number of districts each year, and these were continued as usual in 1949. In the August, 1949, issue of the "Journal" the post-war revival of these competitions was described, and this article deals with activities during the past year.

IN most cases the competitions were well supported by farmers and keen interest was taken in the judging, which was carried out in the winter and spring of 1949.

Southland

Owing to an unfavourable season, crops in Southland were inferior in both yield and quality to those in the previous year's competition. The yield of the winning crop of swedes was 55 tons per acre compared with 77 tons the previous season and the best chou moellier crop was 45 tons compared with 64 tons. The judges were considerably impressed by the high incidence of both dry and wet rots, losses of up to 10 per cent. from these causes being estimated in some crops. The trouble was associated with the season, but too-early eating off of tops seemed to contribute to it.

It was pleasing to see that in every swede entry except one boron was used to correct deficiency of this element. The crop which was not treated showed almost 100 per cent. brown heart infection.

The best crops of swedes were sown ridged in late November, using 8 to 9oz. of seed per acre. Reverted superphosphate at 2cwt. per acre was sown through the back box of the ridgers with the seed with 2cwt. of phosphate sown through the front box. Boron was supplied with the fertiliser through the front box or broadcast before sowing.

The winning yellow-flesh turnip crop was similarly treated, though more fertiliser (3cwt. per acre) was sown through the front box and less (1½cwt.) with the seed, which was sown in early December.

Seed of the winning crop of chou moellier was sown in early December at 2lb. per acre, with 3cwt. per acre of a proprietary fertiliser.

It was usual with the crops to scuffle between the ridges two or three times for weed control, and in some cases ridges were straddle harrowed.

A good example of the danger of using a run-off paddock for swedes was seen; the paddock was infested with club root, the incidence of which obviously was due to the passage of sheep driven off the swede paddock in the previous season.

Balclutha

A hill swede competition was held in South Otago, the winning crop yielding 55 tons per acre. The crop followed potatoes in the rotation and seed was sown in ridges at the rate of 1lb. per acre; 3cwt. of proprietary fertiliser was used, without lime. Crops generally were of good quality. The commonest diseases were dry rot and club root, but they were not present to a serious extent at the time of judging. Brown heart due to boron deficiency was seen in 3 of the 14 entries.

Orange Globe mangolds ready for pitting.

The three best crops were all thinned.

A feature was the increasing popularity of sowing chou moellier with swedes, a practice not previously carried out widely in South Otago.

Waimate

Root competitions were held for the first time at Waimate, and though some good crops were entered, crops in general, owing to the dry season, were not up to the standard of years of average rainfall. Good yields of soft turnips were obtained, but swedes suffered severely from the dry weather and from aphis attack.

Mangolds yielded very well, the average being over 50 tons per acre. The crop is a reliable and valuable winter feed for sheep and cattle in the district, especially when it receives adequate attention in the early stages.

Chou moellier entries were very backward, although the winning crop, which was estimated to yield over 60 tons per acre, was outstanding. It was being utilised by being cut for a town-milk supply dairy herd.

A greenfeed grazing class was included, the winning entry being of Italian ryegrass sown in February after fallow. Half the seed was drilled and half broadcast. The entry placed second was also a good crop, being of ryecorn drilled and Italian ryegrass broadcast following a fallow.

Another class was for greenfeed sown after a grain crop. On the whole the standard was not high, most crops having been sown late owing to dry conditions, and the crops had not grown sufficiently for grazing. The winning entry was a crop of Dun oats which would supply a good bulk of grazing in spring.

Pastures had come through a dry summer and winter, and this affected the number of entries. There were four classes, namely, pastures on light plains land, on flat clay loams, on better clay loams, and on foothill clay loams.

A lucerne competition was also held.

North Canterbury

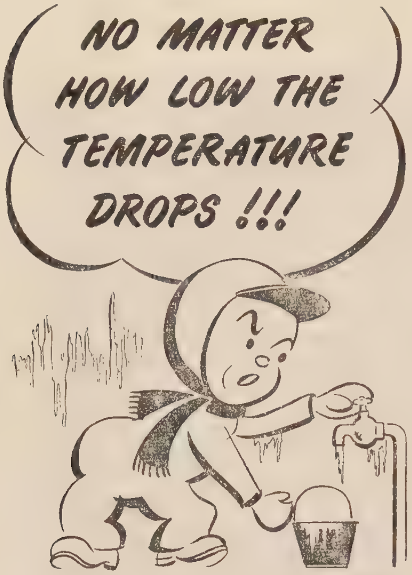
There were large entries in the pasture competitions in North Canterbury and the standard of pastures was very high. Special-purpose pastures sown and managed to provide out-of-season grazing created special interest.

On rather poor downs land ploughed out of browntop and gorse, heavily limed, and fallowed, the following seeds mixture gave good results: 20lb. of perennial ryegrass, 3lb. of white clover, 3lb. of Montgomery red clover, and 1lb. of subterranean clover (all Certified seed). With good management this pasture provided grazing over a long period, subterranean clover providing early feed, white clover and ryegrass producing later, and Montgomery red clover proving its worth in late summer and autumn.

On light, stony land cocksfoot and subterranean clover formed a more important part of the sward, although perennial ryegrass and white clover were also important constituents.

On the Hororata Downs a mixture of 25lb. of perennial ryegrass, 1lb. of crested dogstail, 3lb. of Montgomery red clover, and 2lb. of white clover produced a good sward. However, it was found that although Montgomery red clover provided good late-summer feed for the first 2 or 3 years, ryegrass and white clover eventually took charge and at the time of judging (October) no red clover was evident.

Competitions for lucerne were held in three districts: West Eyreton, Rangiora, and Amuri.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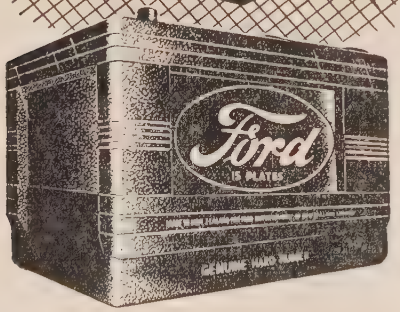

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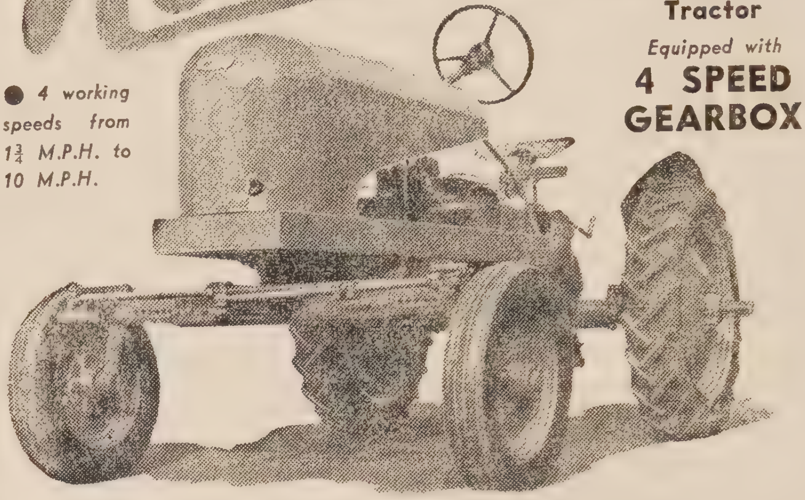

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Left—Conical stack of hay which tied for first in the Whakatane competition. Right—Unused portion of well-built stack of hay at Whakatane; it was unlikely to deteriorate through being held over.

Marlborough

In Marlborough pasture competitions were held in the spring of 1949, and these were the first held in the district. Keen interest was shown and the standard of the winning entry was very high. Land was divided into three classes, according to unimproved value, and class adjustments were made to place all land within each class on the same level.

Nelson

Competitions in Nelson were held in conjunction with the Nelson and Motueka A. and P. Association for cowgrass, lucerne, pasture, and hay. The pasture competition was most keenly contested, entries being of a high standard and ranging over several soil types.

South Taranaki

In South Taranaki competitions were conducted for stacked hay, baled hay, and silage. Points taken into consideration for hay were composition, maturity, condition, and building, and for silage composition, maturity, processing, and waste.

Farmers attending the competitions were supplied with judging cards, and comparisons with the judge's markings were obtained. When attendances were good the competitions were in reality field days and created considerable interest and discussion.

Central Taranaki

Pasture competitions were held at Wharehuia, Tarata, and Pukengahu in spring and autumn and at Strathmore in June. Hay, silage, and root judging was also carried out at Tarata.

Pasture: Wharehuia and Pukengahu

At the autumn judgings there were some high-quality entries. The good season was reflected in some rough pasture, and many entries were not sufficiently harrowed or topped. Where rotational grazing and spelling were practised pastures showed a corresponding improvement.

An innovation in the Wharehuia competition was a prize awarded for the farmer who judged the entries and whose marks were closest to those of the judge.

In the spring competitions at Pukengahu there was a wide variation in pastures. The winning entry was a paddock which had been winter spelled and well grazed. The Wharehuia competition included a number of good-quality pastures in all classes. Dairy pastures showed the benefit of the mild winter and spring. Many of the entries would have improved considerably in clover content with the application of potash.

Tarata

Autumn: Pasture showed a considerable improvement in some cases, but in others the good season was reflected in suppression of white clover by rank growth. Management, particularly on the sheep pastures, could be considerably improved by rotational grazing and spelling.

Spring: There was a lack of vigour in pastures through insufficient topdressing. The levels of phosphate and potash content are limiting factors and until these are built up by heavier topdressing a great deal of improvement cannot be expected.

Hay and silage: The wet season caused most hay crops to be weathered and a number of stacks showed rain penetration after stacking. The silage crops were in general cut when material was overmature. There is little advantage in using a pit for silage in preference to a stack unless the material is well packed around the walls of the pit. If shrinkage allows air to get in to the wall, there will be as much waste as in a stack.

Root crops: There were some very good entries. The good season was beneficial to chou moellier in particular. Two interesting crops of mangolds were seen, the best yielding 74 tons per acre. They were drilled in 7in. rows with 5cwt. of fertiliser.

North Taranaki

There was a decline in competition entries in 1949 in North Taranaki, but this was due to the fact that the Tarata competitions were included in the Central Taranaki section. In North Taranaki all pasture entries were first judged in spring, and in autumn only the top pastures were judged, except for several pastures in the improvement class.

Where farmers accompany the judge and compare cards there tends to be more interest in the detailed assessing of the value of a pasture.

Hay, silage, and crop competitions were followed fairly keenly, but there was a tendency for the same farmers to enter each year, and unless a field day was organised in conjunction with judging, the competitions probably had only limited value.

Whakatane

Hay, silage, and crop competitions were conducted. The general fault in hay was that the grass had been cut rather late when much of the protein formed in the leaves had been replaced by fibrous stem. Most entries contained a high percentage of sweet vernal and browntop, indicating that the pastures had been allowed to deteriorate, probably largely through too frequent cutting for hay.

The silage entries were very good and in general were superior to the hay in feeding value.

Rotorua

Hay and silage: There was a very encouraging increase in entries in Rotorua in 1949. In the meadow hay competition the Rotorua-Ngongotaha branch of Federated Farmers won the A. and P. Association's challenge shield, the result being determined on points gained by the first three placed entries (both baled and stacked) in each district. The challenge shield for lucerne hay, which was judged similarly, was awarded to the Reporoa branch of Federated Farmers.

In the meadow hay section most entries were of a high standard and showed good judgment in the selection of the right type of material to cut, attention to proper curing, and correct building and protection. Little or no difference could be found in the general quality of well-made hay in the stack and well-baled hay; good-quality hay could be made by either method. Most paddocks were closed for hay in October and harvested in January, though some were earlier or later, but in view of the considerable climatic variations throughout the district no generalisation about the best times of closing could be made.

Of the 7 lucerne hay entries 5 were very good, but 2 were only fair because of the high proportion of coarse, thick stem to leaf.

All the silage entries were good, the winning entry being almost faultless. The entries which failed to gain places suffered mainly because of excessive waste due to the use of overmature material and lack of sufficient and properly distributed weighting. The entries showed the ability of Rotorua farmers to convert surplus pasture growth into succulent, high-producing fodder relished by stock.

Swedes: The Ngakuru branch of Federated Farmers won the A. and P. Association's challenge shield for swedes.

Out of the 41 swede entries, 27 were of the Crimson King variety, 6 were Superlative, 4 Grandmaster, 2 Resistant, and 2 were of mixed varieties. Thus Crimson King accounted for 66 per cent. of the total crops entered.

The average quantity of fertiliser used was 3cwt. Serpentine superphosphate was widely used, as was superphosphate and varying mixtures of superphosphate, lime, and blood and bone. Almost all the entrants used 1lb. of seed per acre; 30 broadcast the seed through the fertiliser topdresser and 11 drilled it, mainly in 14in. drills. Generally there appears to be little difference between results from two methods, provided the work is well done. In all cases the crops were on land following grass.

It has been noticeable over 3 years of competitions that, where other conditions are the same, the best-yielding crops have been obtained on land ploughed from grass only a very short time (2 to 3 weeks) before sowing. Light pumice land does not require a long period in fallow as do many of the older soil types. In fact the relatively coarse-textured soils of Rotorua can become so seriously leached of plant material by heavy rainfall while lying fallow that crops, particularly root crops, often completely fail to make normal growth.

The best time for sowing swedes appeared to be November.

Brown heart of swedes, caused by boron deficiency, was gratifyingly less prevalent this year because the practice of applying small dressings of borax with the fertiliser is being adopted more widely by local farmers. The quantity used varied from 4 to 10lb. per acre.

In most cases borax was thoroughly mixed with the fertiliser, and the swede seed was added only when it was ready to be sown.

In some cases the borax was added to half the fertiliser and was broadcast and harrowed in before sowing.

Dry rot is another disease which has been troublesome in some Rotorua crops. Its incidence is greatly increased by "double cropping", which fortunately is not practised very much in the district.

Carrots: Only two entries were received, and though both crops were good, they suffered from insufficient thinning.

Soft turnips: There were only two entries in this class; one was a good crop and the other outstanding.

Matamata

Swedes: Yields of entries were high this year, averaging 46 tons per acre. The winning entry yielded 64 tons per acre. This crop was sown in 14in. rows with 10oz. of seed per acre and 3½cwt. of serpentine superphosphate per acre. The high yield was probably due to the heavy fertiliser application, as other competitors used only 1½cwt. of fertiliser per acre. The winner was the only entrant to use serpentine superphosphate, straight superphosphate being used in most other cases. Some competitors used 20lb. of grass seed sown with the swede seed with the object of establishing permanent pasture, the balance of the seed to be surface sown after the swedes had been eaten off. However, damage from grass-grub caused failures, though the system has been used fairly successfully in the past.

Brown heart was present in several crops and the competition has shown the necessity of applying borax to land in the Tokoroa district intended for swedes.

Silage: With the exception of the winning entry, crops were lacking in good grasses and were cut too late. Waste was excessive through lack of weighting and also through making stacks too large for the amount of grass available.

Pasture improvement: This competition was designed to encourage pasture improvement by any means except ploughing. Fields entered were usually the worst on the farm and capable of much improvement. The greatest improvement was brought about by double topdressing, stock manipulation, the feeding out of good ryegrass hay on the area, and frequent chain harrowings.

Auckland

Best-kept farm competition: This annual competition was continued and a farm-walk field day was held, there being a good attendance of farmers. Methods adopted on the winning farms were fully discussed.

Baled hay: The main faults in the entries were that crops had been cut when the main species were overmature and that material had been bleached during curing.

Stacked hay: This showed the same faults as baled hay.

Silage: Both stacks and pits were entered in the competition and all entries were of very high standard. Crops had been cut fairly early and stored in good condition. The general quality of silage entered was the best seen for some years.

Swede and sugar beet competitions: The winning crop of swedes yielded 55 tons per acre. All the crops entered were sown in 7in. rows through the drill and all were on ground out of old pasture. The seeding rate varied from 12 to 16oz. per acre, and sowing was generally done between late November and late December. Crops sown later were still growing when judged in May and it appeared that they would last longer than the crops sown earlier. This was a factor to be considered by the farmer who required his feed to last into August and September.

Practically no brown heart was seen; only one grower used borax (at 10lb. per acre). In general there was very little disease, although some small areas were badly affected by dry rot.

The winning entry of sugar beet yielded 43 tons per acre. Some of the crops were transplanted from seedbeds, while others were direct seeded. Although the first and second entries were both transplanted, good crops were also obtained by direct seeding.

Warkworth

Competitions were held for pasture, baled hay, stacked hay, silage, swedes, turnips, and maize.

Pasture was judged on production of feed and utilisation of the feed produced. The main fault was the need for better utilisation, particularly in heavy-producing pastures. The need for permanent subdivision was apparent in some pastures and the extended use of the electric fence was suggested by the judges. In this district a danger was the pugging of ground through heavy stock concentration.

The baled-hay section was well contested. Haymaking conditions during the season had not been favourable. Much hay showed a lack of clovers.

The winning entry of silage was stacked in a silo tower and was of outstanding quality.

The winning swede crop yielded 58 tons per acre. This crop was sown in drills in early November after a crop of maize. Nine ounces of seed per acre were sown, and manuring consisted of a dressing of 1 ton of lime and 3cwt. of bonedust per acre.

There were three entries of soft turnips, the winning entry yielding 10 tons per acre. Only one crop of maize was entered and no weighings of the crop were made.

Use of Rubber Rings for Castration

PENS of fat lambs sent forward from New Zealand from the district lamb competitions have been on the whole very favourably reported on by the London judges.

There is, however, strong criticism of the proportion of entries with a heavy scrag (putting weight where it is not wanted), muscular forequarters, and coarser-textured flesh. The judges suggest that the cause of these unsatisfactory features of New Zealand lamb carcasses may be the greater use of the rubber ring method of castration.

It is proposed during the coming season to conduct a carefully organised trial, in conjunction with the Meat Producers Board, to ascertain to what extent the coarseness is in fact due to any one method of castration.

In the meantime the attention of all fat-lamb farmers is drawn to this criticism from the principal customer, and it is suggested that those who use the rubber ring method should be careful that the operation is carried out in accordance with the instructions issued with the instruments. In particular, it is essential that the rings be placed completely clear of the testicles. If the rings are placed too low or if one testicle is higher than the other, sufficient active testicular tissue may be left to cause the development of male characteristics.

Methods of Controlling Poultry Parasites

THOUGH the effects of parasitism are often underestimated or neglected by poultry keepers because they do not show the startling losses characteristic of the more spectacular bacterial diseases, the drop in egg production, loss of condition, and subsequent lowering of resistance to other diseases caused by parasites constitute a source of severe loss to the poultry industry. The importance of controlling parasites, both internal and external, is stressed in this article by J. J. Thompson, Veterinarian, Department of Agriculture, Auckland.

PARASITES may injure poultry in a number of ways. External parasites cause severe irritation and annoyance and in some cases they suck blood. Worms give rise to irritation of the lining of the digestive tract, the subsequent impaired digestion resulting in poor growth and loss of production.

INTERNAL PARASITES

Worms do not multiply within the bird's intestine. Eggs laid by the adult female worm while it is in the intestine are passed out in the droppings of the host and develop further on the ground if temperature and moisture conditions are suitable. In the egg of a species such as the large roundworm and the caecal worm develops a tiny larval worm which under a microscope can be seen moving about actively inside the egg. The time taken for this development varies with conditions of moisture and temperature and the oxygen available. If such eggs are picked up by another bird, they hatch out in the intestine and the larval worms are released. These larvae migrate to a particular portion of the intestine, where they settle to grow into adult worms.

In some species the eggs hatch outside the bird and the larval worms are the infective stages which, when swallowed by a bird, develop into adult worms in the intestine.

Certain species of worms, notably the tapeworm, require an intermediate host to complete their life cycle. The eggs of the worm present in the droppings are picked up by the intermediate host, in which they reach an infective stage. The intermediate hosts of poultry worms are usually slugs, snails, earthworms, beetles, flies, and woodlice. When the intermediate host of a parasitic worm is swallowed by a bird the larval worm is set free and develops to the adult stage. Different species of tapeworm have different intermediate hosts.

Causes of Infestation

A combination of a number of factors may give rise to heavy worm infestation. These factors are:—

Damp areas in houses or pasture: Worm eggs survive for long periods in damp, shady places.

Long grass or weeds on pastures, which supply moisture and shade essential for the development of worm eggs.

Overcrowding in houses and on pastures, which increases the contact of birds with droppings and hence the opportunity of infestation with worms.

Running of young birds with old birds: Young stock have very little resistance to worms. Resistance to infestation increases with age—so-called age resistance.

Poor feeding: A diet deficient in protein, particularly animal protein, and vitamin A makes a flock more susceptible to parasitism.

General Control Measures

Measures must be taken to maintain dry conditions in poultry houses and to reduce contact with the droppings to a minimum. This may be done by using droppings pits or droppings boards which may be cleaned regularly. Alternatively, an efficient deep-litter system protects the birds from their droppings by diluting and absorbing the moisture.

Overcrowding must be avoided. An increase in the number of birds in a house or on a pasture increases the amount of droppings and therefore the risk of infestation.

Keeping the grass short in pens and pastures permits sunlight to destroy worm eggs. The eggs are resistant to cold, but are destroyed fairly quickly by heat.

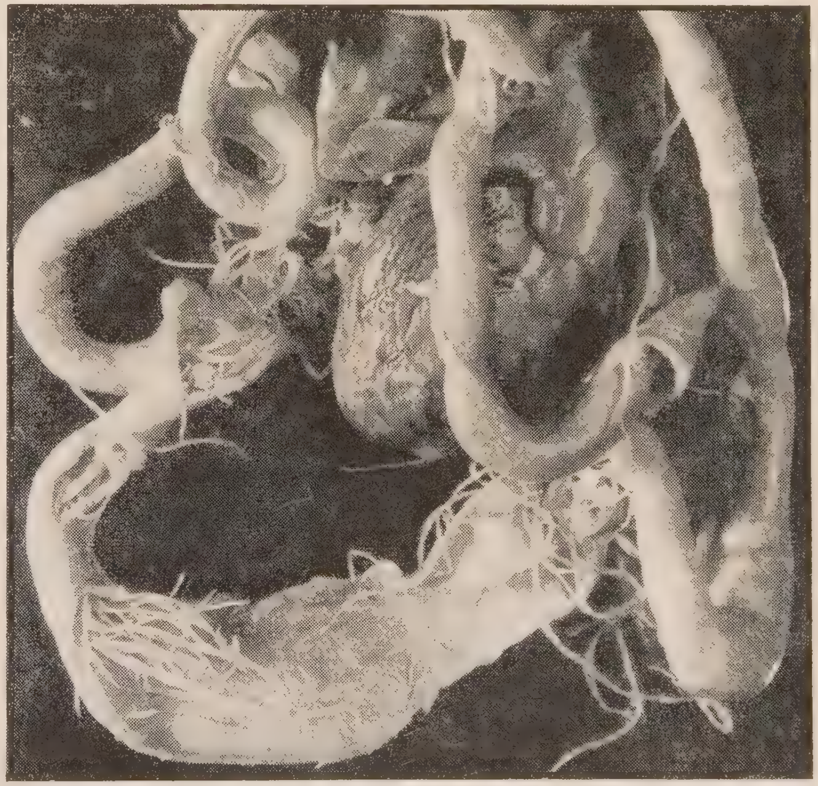
Good drainage prevents the formation of dangerous damp patches in and around the houses, though damp patches may arise from faulty drinking fountains.

As young stock are less resistant and more susceptible to infestation than old stock, they should not be run together on the same pasture, nor should young stock be placed in pens or pastures recently vacated by old stock. Running successive batches of young stock on the same pasture also leads to heavy worm infestation; rotation of runs is a useful preventive measure.

Pens used in conjunction with brooding houses must be clean and have a long spell unoccupied; otherwise the top 3 to 4in. of soil should be replaced with fresh soil.

Culling of weak or diseased birds is essential, as such birds are frequently reservoirs of infection and a menace to the rest of the flock.

A well-balanced diet containing adequate protein assists in building up resistance to parasitism. Vitamin A has also been shown to be important in this respect, and therefore a supply of good green food or a vitamin A concentrate oil is essential for all birds.



The intestine of a fowl cut open to show a heavy infestation of roundworms.

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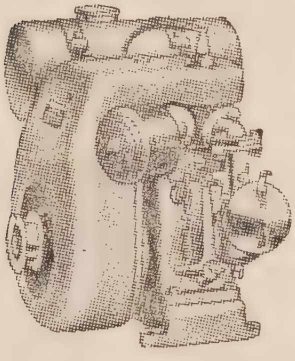

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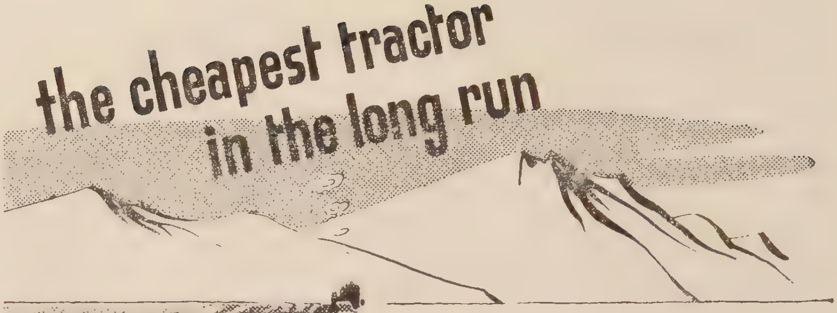

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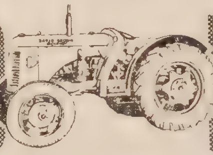

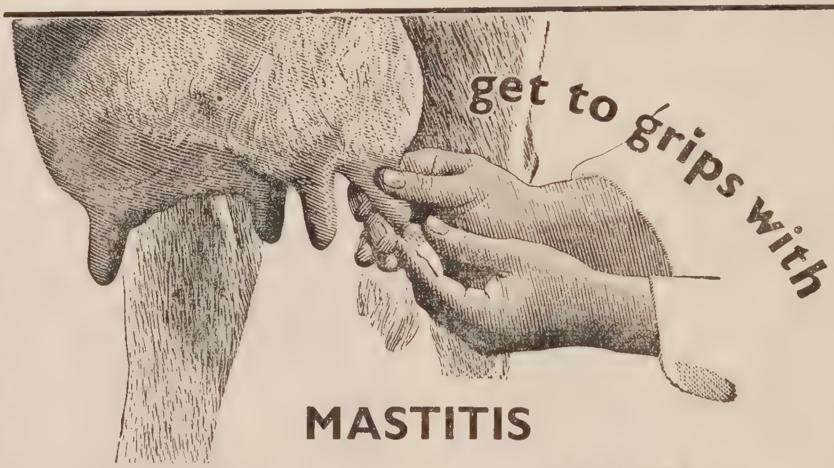

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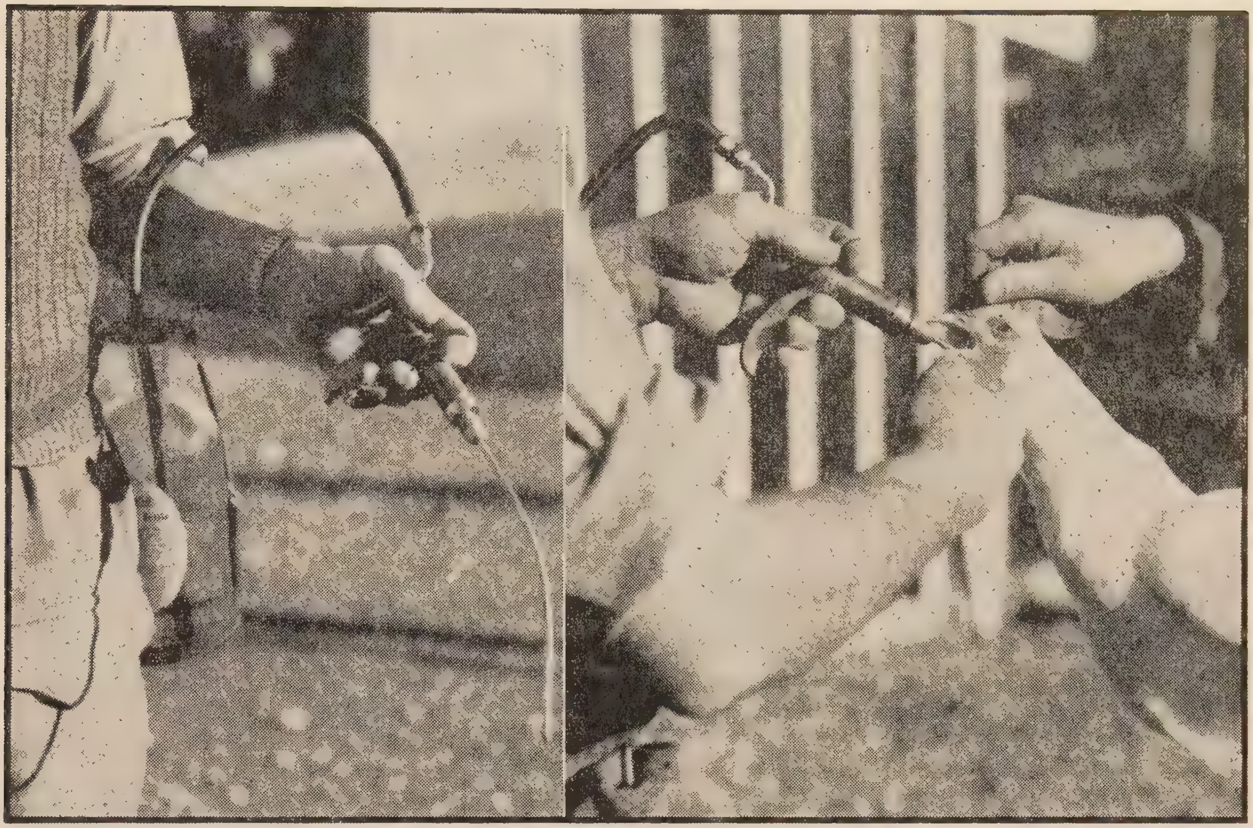


If birds must be treated for roundworm infestation, individual dosing is advisable, and if a large number has to be dosed, an automatic drenching gun is a worth-while investment. Left—Such a gun ready to be used. Right—A bird being dosed with an attendant holding its head.

Large Roundworms

The commonest species of worm occurring in New Zealand flocks, the large roundworm (*Ascaridia galli*) is a cause of considerable economic loss. Most poultry keepers are familiar with this worm, which may be up to 5in. long and is greyish-white.

Life History of Roundworms

The eggs are passed out in the droppings and under favourable conditions develop to infective larvae in 8 to 12 days. When picked up by another bird the larvae are freed from the egg in the intestine and invade the gut wall, where they feed and grow for about 10 days. They then return to the canal of the gut and grow to the adult stage about a month after the eggs were picked up.

Results of Roundworm Infestation

Heavy infestation results in severe damage to the intestinal wall of a bird, including destruction of the lining and sometimes haemorrhage into the bowel.

Diarrhoea and loss of appetite are common symptoms in young birds. External signs are paleness of comb and legs, drooping feathers, and listlessness. Stunted growth is a frequent result.

Older birds show reduced egg production, loss of condition, and pale comb and legs. The presence of worms may give rise to a voracious appetite.

Infested pullets of 4 to 5 months of age frequently are backward and do not come into lay. A heavy worm burden also predisposes birds to infection with other diseases, notably intestinal coccidiosis.

Control of Roundworm Infestation

The general measures of control advocated for internal parasites should ensure comparative freedom from infestation with the large roundworm.

Treatment may be either by dosing the flock or by dosing individual birds. Dosing a flock is not very satisfactory with the drugs available at present, as frequently the worst-affected birds do not eat the medicated mash. Further drastic effects may result in a flock, causing a severe setback.

Individual dosing is advisable, as each bird then receives a measured dose. Carbon tetrachloride is efficient and safe if used with reasonable care. It may be given either in capsule form or with an automatic drenching gun. If a large number of birds has to be dosed, the automatic gun is a worth-while investment for the poultry keeper, and a demonstration of the method of using the gun can usually be arranged with the local Poultry Instructor of the Department of Agriculture.

The birds should be starved overnight before being dosed in the morning. The doses recommended are: For birds of 5 months or older, 2 c.c.; for birds of 2 to 4 months, 1 to 1½ c.c.

Birds in infested flocks should be dosed when they are 10 to 12 weeks old and again at 4 to 5 months—that is, before going into the laying house. In practice it has been found advisable to recommend this as a routine measure in New Zealand.

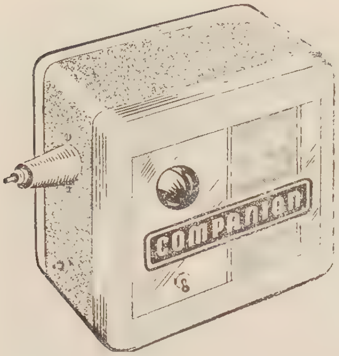
Caecal Worms

A small roundworm, whitish and up to ½in. long, the caecal worm (*Heterakis gallimone*) is present in the blind gut of almost every fowl. In small numbers these worms are harmless, but occasionally young chicks harbour large numbers, which cause serious inflammation of the caecal wall.

Caecal worms are also important as a carrier of blackhead, which may cause losses in young fowls, but is of much greater significance in turkeys.

Control of Caecal Worms

The life cycle is somewhat similar to that of the large roundworm and the same general measures of sanitation and management should be taken to control them.



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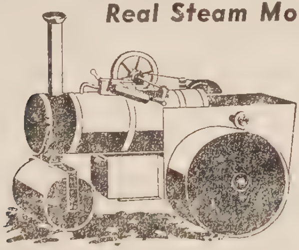

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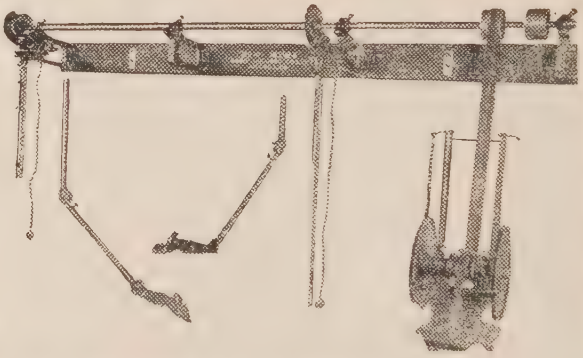

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INSECTICIDES FOR USE AGAINST EXTERNAL PARASITES OF POULTRY

PARASITE	INSECTICIDE	METHOD OF USE		
		Dusting powder	Spray or dip	Fumigant
LICE	Sulphur	Spread on litter and in nests at 2lb. per 100 sq. ft., repeated in 10 days, or at 4lb. per 100 sq. ft. in one application.		
	Sodium fluoride	Applied in pinches or from a shaker under wings and on body, neck, and vent.	Dip made by adding 1 large tablespoonful to 1 gallon of warm water.	
	Nicotine sulphate 40 per cent.			Painted on perches before birds roost at 1oz. to 15ft., repeated after 10 days.
	Benzene hexachloride (B.H.C.)	0.5 per cent. gamma isomer applied by pinches or with a shaker.	Birds sprayed in coop or catching pen with water suspension of 12oz. of wettable powder to 1 gallon of water; 3 pints of spray per 100 birds. May also be used as a dip.	Perch paint containing 1 per cent. gamma isomer used at 1oz. to 15ft. Smoke generators used to fumigate clean, empty house.
	D.D.T.	5 to 10 per cent. dust applied in pinches or with a shaker.	Birds sprayed in coop or catching pen with water suspension of 1lb. of wettable powder to 4 gallons of water (1.5 per cent.); 3 pints of spray per 100 birds. May also be used as a dip.	
FLEAS	Sulphur	As for lice.		Burnt in empty house.
	D.D.T.	5 to 10 per cent. dust scattered on litter and nests.		
	Benzene hexachloride (B.H.C.)	Scattered lightly on top of litter and nest boxes.	Houses sprayed with 0.5 per cent. water suspension.	
RED MITE	Nicotine sulphate 40 per cent.			As for lice.
	D.D.T.		Houses sprayed with 1.5 per cent. water suspension.	
	Benzene hexachloride (B.H.C.)		As for fleas.	Perch paint as for lice.

If it is found necessary to treat birds for caecal worm infestation, phenothiazine is the most efficacious drug available. A dose of 0.5 gm. per bird is added to the mash and the medicated feed supplied to the birds for a day and repeated in 10 to 14 days.

Tapeworms

The head of a tapeworm, which is flat and white, is equipped with hooks or suckers and buries itself in the lining of a bird's intestine. Behind the head the body consists of a series of segments, which become progressively wider toward the posterior end of the worm. Each of these segments contains a complete set of male and female organs, and self fertilisation occurs. The segments at the posterior end contain fertile eggs, and these drop off and are passed out in the droppings, where they may be seen on close examination, having the appearance of rice grains.

At this stage the eggs are harmless to other birds. They require to pass part of their life cycle in intermediate hosts such as beetles, ants, house flies, slugs, or snails. The parasites develop to the larval stage in the intermediate host, and birds become infested when they eat insects, slugs, or snails containing the tapeworm larvae.

A number of different species exist, varying in size from *Davainea proglotinea*, which is about 1/10in. long, to others of up to 10in. long. Though heavy infestations may have serious effects on young birds, causing unthriftiness, loss of condition, diarrhoea, and decreased egg production, tapeworms have not been found to be of serious importance in New Zealand.

Control of Tapeworm Infestation

No satisfactory method of treating fowls for tapeworm infestation is known. Control measures consist of keeping the area round the houses clear of rubbish such as old sacks and damp wood, in which breed many of the insects which act as intermediate hosts. Damp places around feed or water troughs are also sources of danger.

Slugs and snails are sometimes present in large numbers on pastures and constitute a danger as intermediate hosts. Spraying the affected pasture with a 1 per cent. solution of copper sulphate (bluestone) eliminates them.

Other Internal Parasites

In other countries serious losses of young birds, particularly turkey poults, are caused by gapeworms, which occur in the windpipe, but they have never been found in poultry in New Zealand.

Threadworms or hairworms, which occur in the crop, gizzard, and intestine and are usually difficult to detect with the naked eye, may also be troublesome in poultry flocks, but are of little significance in New Zealand.

Control measures for these parasites are similar to those advocated for large roundworms.

EXTERNAL PARASITES

Some of the dusting powders and other insecticides recommended for use against external parasites of poultry may be irritating to the nasal passage of the operator. If such a substance is being used extensively, a mask or damp cloth tied round the nose and mouth is a wise precaution.

Lice

The commonest external parasites of poultry, lice are generally classified according to the part of the body they infest—head lice, body lice, wing lice, or shaft lice. If the feathers of an infested bird are parted, the lice may be seen moving rapidly on the skin. They are most common in the region of the vent. Poultry lice live on skin fragments and skin debris. They are biting lice and do not suck blood.

Lice spend their entire life cycle on the host. In 2 or 3 months a single pair of lice may produce more than 100,000 descendants. Though lice may survive for months on a bird, the period of survival away from the host is 4 to 6 days.

In badly infested birds the base of the feather stem, particularly in the region of the vent, is surrounded by a grey-white, pear-shaped, powdery mass consisting of the eggs or nits of the lice, firmly attached to the feather shaft.

The eggs hatch out about a week after they are laid and the young lice become mature in about 2 weeks.

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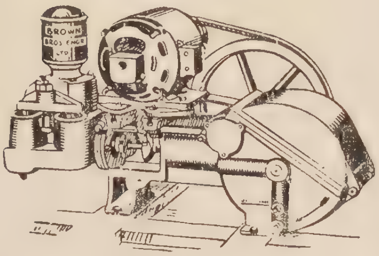

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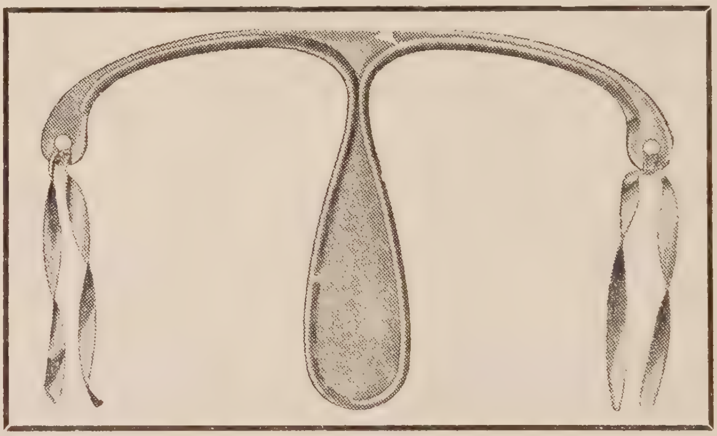

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Control of Lice Infestation

Fortunately drugs of known efficacy are available for the destruction of the external parasites. Only some of these and methods of using them will be described.

Some of them are well known and have been in use for many years. Others, such as D.D.T. and benzene hexachloride (B.H.C.), are of comparatively recent development. B.H.C. is used in a number of different forms—as insecticidal dusting powders, as a wettable powder for suspension in water, with an oily vehicle as a perch paint, and in smoke generators. The gamma isomer is the killing agent in benzene hexachloride, so a B.H.C. product is referred to as containing a certain percentage of gamma isomer.

Lice multiply more rapidly during cold weather, when the birds are in closer contact than in warm weather. Therefore the best time for applying control measures is during the milder days of autumn. Insecticides may be used in the form of dusting powders, fumigants, dips, or sprays.

Dusting powders shown to be effective against lice in poultry include sulphur, mixed with the litter in the proportion of 2lb. per 100 sq. ft. and repeated in 10 days or used once at 4lb. per 100 sq. ft.

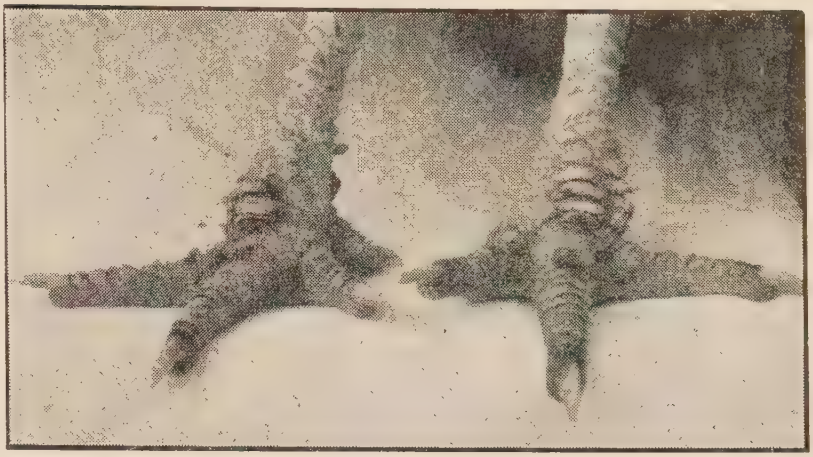
D.D.T. powder (5 to 10 per cent.) and sodium fluoride dust, applied with a shaker or by "pinches"—the amount held by the finger and thumb—to the neck, body, and vent and under the wings, have given good results. The shaker method is more wasteful and should be carried out over a tray to catch the excess powder.

Benzene hexachloride dust (0.5 per cent.) is very satisfactory used by the pinch or shaker method. It may also be applied to the litter or nest boxes as a light dusting. The characteristic musty odour of benzene hexachloride does not cause taint provided the feed is not contaminated. Feeding and water troughs should be removed before B.H.C. is used. Purer forms of this insecticide which are free from the somewhat objectionable odour are also available. Benzene hexachloride is one of the most effective agents for destroying external parasites of poultry.

A dusting powder containing a mixture of D.D.T. and benzene hexachloride has also been shown to be of value.

Of the fumigants, a 40 per cent. solution of nicotine sulphate painted on the perches has given reliable results against body and wing lice, but is not so effective against neck lice. The solution should be applied at the rate of 1oz. to 20ft. of perch, the treatment being repeated 10 days later.

Benzene hexachloride (1 per cent.) in oily solution is very useful as a perch paint, 1oz. being applied to 10ft. of perch. B.H.C. perch paint has the advantage over nicotine sulphate that it need be used only once because of the residual or lasting effect of benzene hexachloride.



[*Fraser Niederer photo.*

The shanks and feet of an Australorp affected with scaly leg. This condition is not a sign of old age, as is commonly believed, but is caused by a mite.

Perch paints should be used on a calm evening before the birds go to roost, otherwise the fumes which kill the lice on the birds may be carried away too rapidly.

Smoke generators incorporating benzene hexachloride are more limited in use. They are useful when burnt in a clean, empty house to apply a fine dust in the cracks and crevices which offer breeding places for red mite and other ecto-parasites. They have been shown to kill body lice on birds kept in a house while a generator is burning, but the smoke gives rise to some irritation of the nose and throat.

Sprays may be used on the birds and to treat empty houses, both methods being more effective than dusting with powders. Sprays may be applied from a bucket pump with a fine nozzle on to the birds at roosting time or with the birds penned in a crate. It is often sufficient to crowd the birds in a corner with catching frames. D.D.T. or benzene hexachloride wettable powder, which can be mixed with water to make a suspension, is used, D.D.T. at the rate of 1lb. to 4 gallons to give a 1.5 per cent. concentration, and benzene hexachloride at 12oz. to 1 gallon of water, giving a 0.5 per cent. gamma isomer concentration. Birds should be confined to a small area such as a coop or catching pen to ensure that each receives sufficient of the spray. The amount used is about 3 pints per 100 birds. The residual effect of both D.D.T. and benzene hexachloride is such that they continue to be lethal to the lice for a considerable period after application. Freedom from lice may continue for up to 2 or 3 months, depending on the concentration used and the effectiveness of the application. Houses or range shelters should be sprayed with either of these substances before the birds are placed in them. Care must be taken to spray thoroughly the perches and any cracks or crevices in the walls of the houses.

Preparations of D.D.T. and B.H.C. at half the strengths given for sprays are suitable for dipping individual birds.

Red Mites

Though it is a common parasite in poultry houses, red mite (*Dermanyssus gallinae*) may be overlooked because it breeds in cracks and crevices in the house and feeds on the birds only at night. The colour of this parasite varies from grey to red, depending on whether the mite has had a feed of blood recently.

In an infested poultry house the ends of the perches show large masses of grey and red specks. In severe cases the mites appear on the walls and possibly on the cross-beams, frequenting the darker areas of the house in particular. The mites crawl along the perches at night to feed on the roosting birds. They are capable of surviving for several months in empty houses.

The irritation and loss of blood cause loss of flesh and condition in the birds. The egg yield is often affected badly. It is also suspected that certain diseases, such as fowl cholera and leucosis, may be transmitted by these blood-sucking mites.

Control of Red Mites

It is advisable that all perches be detachable for easy inspection and treatment and that they be kept clear of the walls of the house.

Creosote sprayed or painted on the perches, particularly on the ends, has proved effective in controlling red mite, and other portions of the house which may harbour the parasite should also be treated. Kerosene spraying is also useful.

Spraying with D.D.T. suspension or benzene hexachloride water suspension has the advantage of its residual effect. Creosote lacks this persistent after-effect and when it has dried into the wood is no longer effective. Therefore for preventive purposes 1.5 per cent. D.D.T. suspension in water or 0.5 per cent. benzene hexachloride should be sprayed thoroughly over the walls, floor, perches, and nests. If the house is badly infested some of the birds may harbour red mite, but the parasites will be destroyed by the D.D.T. or B.H.C. when they drop off the birds on to the treated perches.

Fumigation using 40 per cent. nicotine sulphate or B.H.C. perch paint as advocated for lice control is useful against infestations of red mite. The nicotine sulphate treatment should be repeated in 10 days' time to catch parasites which escaped the first treatment of the perches.

Houses should be well lit to avoid having dark places which red mites choose as breeding places.

Scaly-leg Mite

The mite responsible for the condition of scaly leg in fowls is usually confined to the legs, but occasionally affects the comb and wattles. The mites (*Cnemidocoptes mutans*) burrow between the scales of the leg, and the condition can be recognised easily by the enlargement and rough appearance of the feet and legs. In severe cases birds go lame and are scarcely able to walk; loss of flesh and occasionally death result.

The condition is spread by contact and therefore it is advisable to remove and isolate affected birds for treatment. Dipping the feet and legs in crude oil and scrubbing them with a brush is an effective remedy. Kerosene may also be used after the scale has first been softened by scrubbing with hot water and soap. A mixture of 1 part of kerosene with 2 parts of linseed oil is less irritating than pure kerosene. Care must be taken to avoid allowing the oil or kerosene to touch the fleshy part of the leg.

Depluming Mites

A species which occasionally infects fowls, the depluming mite (*Cnemidocoptes gallinae*) causes intense itching, resulting in feathers being broken off. The consequent depluming is sometimes mistaken for the result of feather picking or a moult. The mites live at the bases of the feathers, and examination of the feather stumps reveals the presence of the typical scales and crusts.

This condition may be controlled by applying to the affected parts an ointment made by mixing thoroughly 1 part of flowers of sulphur with 4 parts of petroleum jelly or lard. Where a number of birds are affected they should be isolated and, if necessary, the house treated as for red mite.

Fleas

Though the harmful sticktight flea has not been found in New Zealand, other species, particularly the ordinary poultry flea (*Ceratophyllus gallinae*), which infest poultry houses may irritate the birds and affect production.

Fleas are also likely to be very troublesome to human beings, especially when the infested house has been empty for a short period. People entering a vacant poultry house containing the old litter will find that considerable irritation results from an attack by hungry fleas.

Fleas breed in dust and litter; they do not live on the fowls, but stay on them long enough to feed and drop off to breed in the nests and litter. The use of 10 per cent. D.D.T. powder or 0.5 per cent. benzene hexachloride powder in the litter and nests is sufficient to eradicate fleas.

Flies

The use of a D.D.T. spray or benzene hexachloride wettable-powder spray on feed sheds and other places is also recommended to keep down flies. The domestic fly is a carrier of disease and the fly population should be kept at a low level. Smoke generators are most useful for this purpose.

Further advice and assistance can be obtained by a poultry keeper by applying to the nearest Poultry Instructor personally, by letter, or through the nearest office of the Department of Agriculture. Departmental Veterinarians who specialise in poultry work are stationed at Auckland for the North Island and Christchurch for the South Island.

Tractor Safety

THOUGH New Zealand has vast stretches of plains to be cultivated, many districts have little or no flat ground. Both islands have large acreages of steep to very steep country under cultivation, and on such land occurs a fair proportion of the tractor accidents. Farmers who work steep country become accustomed to the risks. Sometimes they tend to become slightly reckless, and at other times positively risky jobs are done.

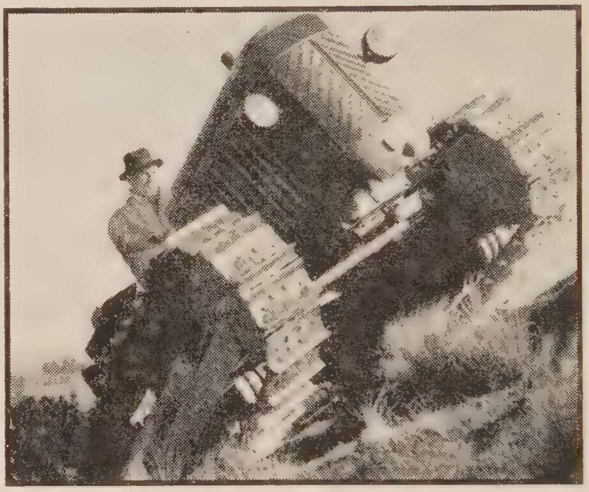
However, for the initial stages of breaking in virgin country, the surface sowing of grassland which has become run out, and topdressing there seems little necessity for working faces or very steep pinches. Very steep ground is hard to work, causes undue strain on implements and men, and produces poorer crops and erodes more readily than the less steep slopes, which would benefit by more or better cultivation and in turn give higher yields. Moreover, the steep pinches and faces take their toll of injuries and deaths.

Therefore, when working on steep country a tractor driver should keep the following in mind:—

Keep speed down when ploughing on stony or stumpy ground, where rabbit warrens may cause a furrow wheel to sink or a land wheel to dip and rise suddenly, where headlands afford a poor grip on a sidling, and where braking may cause a skid.

Engage a lower gear before going down hill where the load has any chance of taking control, because once a tractor has gained momentum it is impossible to engage lower gears.

Apply brakes evenly, not fiercely, at all times and especially when working on a greasy surface or on wet or frozen grass. If the tractor is on a slippery slope when the brakes are applied fiercely, it will skid from top to bottom, and only good fortune will enable the driver to keep his seat and steer the outfit so that no damage is done.



[Green and Hahn Ltd. photo.

Engage the clutch gradually to prevent rearing, which is particularly important when the front wheels of a tractor are on a higher level than the rear ones.

Extend grippers when operating on greasy surfaces or sidlings. Grippers used inside the wheels give better results, especially when ploughing on hillsides, because both grippers are operating on soil having the same compactness.

Jump off toward the uphill side, where most clearance is available, should an outfit get out of control. No machine is worth a human life.

Plan all work so that there is no need to damage machinery or to risk injuries or loss of life.

—*J. N. WHYTE, Farm Machinery Instructor, Department of Agriculture, Dunedin.*

Shifting Hives of Bees

Seasonal Notes for the Domestic Beekeeper

DOMESTIC apiary sites are usually of a non-permanent nature, and frequently beekeepers are required to shift their bees. In this article R. Goddard, Apiary Instructor, Department of Agriculture, Tauranga, outlines measures to be adopted when shifting hives.

APIARY sites should be selected with great care, as future crops may depend on the location of hives. If possible, hive entrances should face north to get maximum benefit from the sun. A good shelter from the prevailing winds is essential, but hives should not be placed under trees or too close to hedges, as bees often tend to be vicious if subjected to too much shade. Moreover, bees in hives too well sheltered are inclined to breed out of season and to use an excessive amount of honey stores during winter.

In an emergency hives may be moved at any time during the year, providing special precautions are taken not to disturb the bees unnecessarily. However, the best time to shift beehives in most districts is in early spring, when there is comparatively little honey, the bees have abandoned the winter cluster, and brood rearing has just begun.

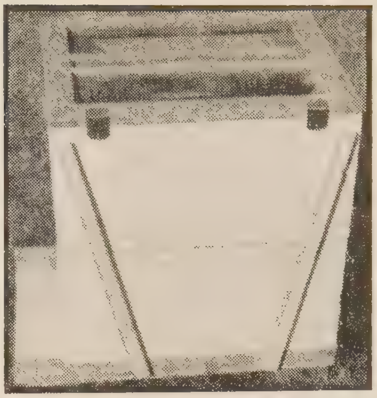
Often the domestic beekeeper is faced with the problem of moving bees from one corner of the garden to another or from the front to the back of the section. In shifts of this type in spring or early summer the hive is moved a few feet only each day in the required direction. When doing this it is advisable to place a board or some distinctive object alongside the alighting board to serve as a guide to returning field bees in finding the hive entrance.

Use of Small Nucleus Hive

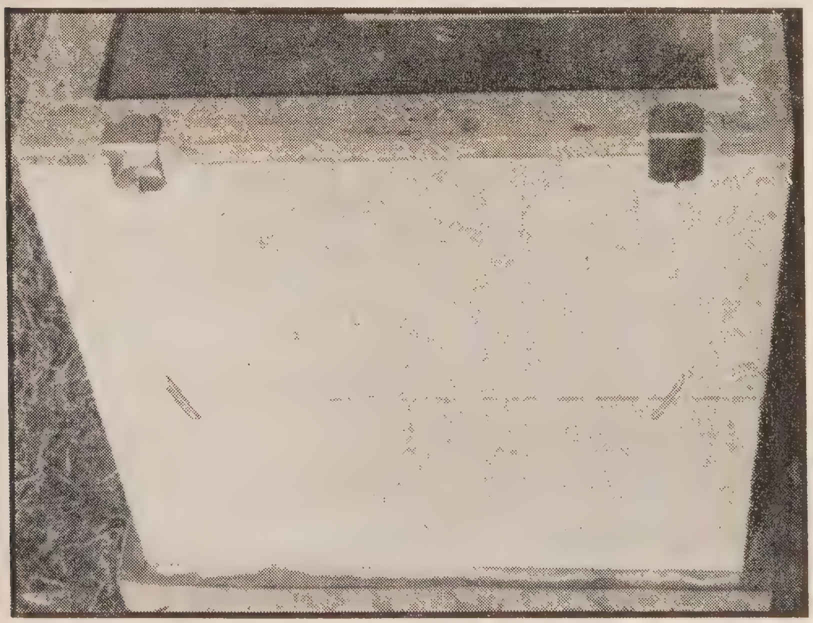
If a hive is to be shifted to a new site up to 3 miles distant, it is necessary to adopt further precautions to prevent hives from coming apart in transit. In addition, the field bees are likely to return to their previous site when the hive is first opened after removal. Where this happens to any extent a small nucleus hive left on the old hive stand will accommodate the returning field bees, and after a few days they may be reunited with the parent colony.

A few days before the removal is due to take place the colony should be prepared in the following manner:—

Remove all surplus honey, and if simplicity frames are used, it is advisable to pack pieces of newspaper between the ends of the top bars to prevent the frames coming together and squashing the bees. Crate staples can be used effectively to prevent supers and bottom boards slipping during transit. Alternatively, slats of wood secured diagonally from the bottom board to the top super may be used. Select a cool, cloudy day for removal, and on these short distances the hive entrance may be blocked with grass. When the hive has been placed on its new site the bees should not be released until they have had sufficient time to settle; the grass blocking the entrance may then be removed.



Wooden slats placed two on each side of a hive hold the hive parts together securely.



A gauze screen on top of the hive held in position by two galvanised lugs. The two supers are held together by crate staples.

If hives are to be shifted longer distances, added precautions are necessary to ensure that the bees are not suffocated on the journey. A gauze screen with a wooden frame of 2in. x 1in. timber and the same length and width as a standard super should be constructed. In addition, hives should be housed in satisfactory woodwork; otherwise escaping bees may cause the person carrying out the removal to abandon the task. The entrance of the hive may be blocked with gauze or a piece of wood. Providing all preparations for removal have been carried out beforehand, it is a simple matter to remove the mat and lid from the hive and to tack the gauze screen in position.

Adequate Ventilation Essential

If possible, hives should be shifted at all times by road transport, as the constant jarring experienced during rail transport excites the bees to such an extent that the resultant high temperatures are sufficient sometimes to melt the bee combs partly and to suffocate the bees.

Therefore, if bees are to be sent by rail, it is of the utmost importance to ensure that they have adequate ventilation on their journey.

In any case it is advisable to cover the hives from the direct rays of the sun during the period of confinement and transit.

Those domestic beekeepers who desire to shift their beehives long distances and who have had no previous experience in such work are advised to seek additional information from their local Apiary Instructor.

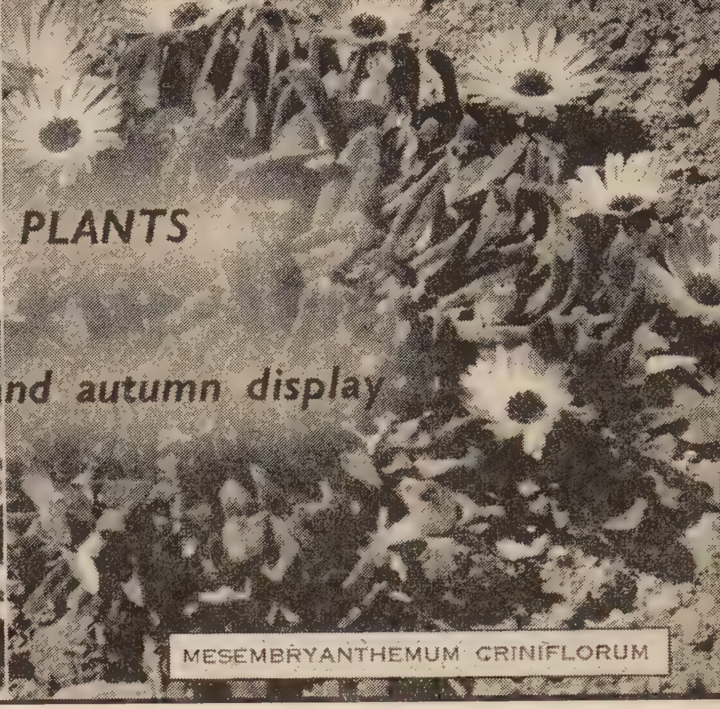
Domestic beekeepers are reminded of their obligations under the Apiaries Act, 1927, whereby no beekeeper may shift hives a distance of more than 10 chains unless a removal permit has been obtained from the local Apiary Instructor.

This precaution is necessary to prevent the possible spread of brood diseases to clean areas.

BEDDING PLANTS

for summer and autumn display

URSINIA ANTHEMOIDES


MESEMBRYANTHEMUM CRINIFLORUM

THE lists of hardy and half-hardy annual flowering plants on this page contain the names of those which are usually raised from seed in a glasshouse and pricked off into boxes before being transplanted into open ground. Some of the varieties which can be raised easily by sowing seed broadcast in open borders during October and November are *Matthiola bicornis* (night-scented stock), mignonette, nasturtium, shirley poppy, virginian stock, *linum grandiflorum,* linaria, viscaria, and eschscholtzia. For seeds and seedlings of hardy and half-hardy annuals the cultural details are the same except that the half-hardy ones are sown during July-August to ensure vigorous plants before the flowering season and seeds of hardy annuals are sown in September; both groups prefer a gentle heat during germination. The raising of bedding plants was described fully in an article by C. K. Ellis in last month's "Journal".

HALF-HARDY ANNUALS

Name	Common Name	Approximate height	Colour
Ageratum mexicanum	Floss flower	6in. to 2ft.	Blue or white
Arctotis hybrids		6in. to 2ft.	Various
Callistephus chinensis	Aster	6in. to 2ft.	Various
Celosia cristata	Cockscomb	1 to 2ft.	Various
Cosmos hybrids	Cosmea	2 to 4ft.	Various
Helipterum (Rhodanthe) manglesie and vars.	Australian everlasting	1 to 2ft.	Various
Limonium sinuata	Sea lavender	1 to 2ft.	Various
Lobelia erinus and vars.		6 to 9in.	Blue shades, blue and white
Matthiola annua	Ten-week stock	1 to 1½ft.	Various
Mesembryanthemum criniflorum	Livingstone daisy	6in.	Various
Nemesia strumosa and hybrids		1ft.	Various
Nemesia suttoni and hybrids		8in. to 1ft.	Various
Petunia hybrids*		1 to 2ft.	Various
Phlox drummondi		9in. to 1½ft.	Various
Salpiglossis sinuata and vars.		2 to 3ft.	Various
Schizanthus species and strains	Butterfly flower	1 to 1½ft.	Various
Tagetes erecta	African marigold	2 to 3ft.	Yellow
Tagetes patula	French marigold	1 to 1½ft.	Orange, red, brown
Ursinia anthemoides	Jewel of the veldt	1ft.	Yellow and purple
Ursinia pulchra		1 to 2ft.	Yellow and brown
Venidium fastuosum		1½ to 2½ft.	Orange and purplish black
Zinnia elegans		1 to 2½ft.	Various

* Half-hardy perennials which are treated as annuals.

HARDY ANNUALS

Name	Common Name	Approximate height	Colour
Alyssum maritimum	Sweet alyssum	6 to 10in.	White, fragrant
Calendula officinalis and vars.	English or pot marigold	1ft.	Orange, yellow, lemon yellow, with fluted petals
Centaurea cyanus	Cornflower	1 to 3ft.	Blue, rose, white
Centaurea moschata and vars.	Sweet sultan	1 to 2ft.	White, purple, yellow
Chrysanthemum carinatum and vars.	Annual chrysanthemum	1 to 2½ft.	Yellow, white, purple
Clarkia elegans and vars.		1 to 2ft.	Various
Delphinium (annual)	Larkspur	1 to 3ft.	Pink, blue, white
Dimorphotheca aurantiaca	Star of the veldt	2ft.	White, red, yellow, orange
Godetia spp. (annual)	Godetia	1 to 2ft.	Various
Helichrysum bracteatum	Everlasting flower	2 to 4ft.	Various
Iberis umbellata and vars.	Candytuft	1ft.	Various
Kochia scoparia trichophylla	Summer cypress	2 to 3ft.	Crimson-tinted autumn foliage
Lathyrus odoratus	Sweet pea	6 to 10ft.	Various
Lavatera trimestris	Mallow	4 to 6ft.	Rose, white
Linaria spp.		9in. to 1½ft.	Various
Linum grandiflorum and vars.		1 to 1½ft.	Scarlet, rose red
Lychnis spp. (annual)	Viscaria	1ft.	Various
Malcomia maritima	Virginian stock	6in.	Various
Matthiola bicornis	Night-scented stock	1ft.	Purplish red
Nigella spp. and vars.	Love-in-a-mist	1 to 2ft.	Blue, white, single and double
Papaver rhaes	Shirley poppy	1½ft.	Various
Reseda odorata	Mignonette	1 to 1½ft.	Yellow, white, fragrant
Scabiosa atropurpurea	Sweet scabious	1 to 3ft.	Various, single and double
Senecio elegans	Jacobaea	1 to 2ft.	Various
Tagetes signata var. *pumila*		9in. to 1ft.	Yellow
Tropaeolum majus	Nasturtium, tall	5 to 10ft.	Various
Tropaeolum majus var. *nanum*	Nasturtium, Tom Thumb	1ft.	Various
Xeranthemum annum and vars.		1 to 2ft.	Various

—H. P. THOMAS, Vegetable Instructor,
Department of Agriculture, Wanganui.

[*Photograph of Ursinia anthemoides by Douglas Elliott.*

Tuberous Begonias can be Grown by the Amateur Flower Gardener

EACH year in many parts of New Zealand appear brilliant displays of tuberous-rooted begonia blooms, particularly in the greenhouses of parks and reserves. For perfection of bloom and variety and intensity of colour these flowers are truly magnificent. The begonia has often been referred to as "the queen of greenhouse plants," and in view of this many amateur gardeners seem to think their chances of growing them successfully are small, but in fact the tuberous-rooted begonia is one of the easiest of all greenhouse subjects to grow to perfection. September brings the first major activity in the new season's growth of the begonias, and in this month's article for the flower gardener C. K. Ellis, Horticulturist, Department of Agriculture, Dunedin, discusses the main points in the culture of these magnificent flowers.

[National Publicity Studios photo.

A fine display of tuberous-rooted begonias in a small, home-garden greenhouse.

THE only disadvantages of the begonia are that it flowers in summer, that it is more a greenhouse plant than a border plant, and that the initial cost of tubers is rather high, though that factor is likely to decrease in importance as the plant becomes more widely cultivated and amateurs are able to propagate their own new stock. Though begonias are normally grown in greenhouses, they often thrive outdoors in the warmer northern districts and in a few favoured localities in the south. However, this article deals chiefly with the culture of the plants under glass.

A stock may be built up in one of three ways—by raising the plants from seed, by propagating from cuttings, or by obtaining tubers 1 or 2 years old.

Raising Plants from Seed

Tuberous begonias are remarkably easy to raise from seed in a greenhouse, though the task is a very "fiddly" one during the early growth stages of the seedlings. The seed-bed soil mixture described in the article about raising bedding plants in last month's "Journal" is an excellent medium in which to germinate the seed. Another mixture widely favoured for this purpose consists of equal parts by bulk of leaf mould, good loam, and clean, sharp sand. The seed-pans or boxes should be prepared exactly as described in last month's article. The receptacles should be thoroughly watered and drained before the seed is sown.

[Jack Welsh and Sons photo.

Mixed with a little fine sand or powdered, dry soil, seed may be sown directly from the packet, but the gardener with little experience is better advised to sow it pinch by pinch.

Begonia seed is exceedingly fine, and until some experience has been gained difficulty may be found in sowing it thinly and evenly enough. A teaspoonful of fine sand or dry powdered soil mixed with the seed before it is sown is of considerable assistance. The seed is so small that it need not necessarily be covered with soil; if it is, the soil cover should be very light. The boxes or pans should not be watered again at this stage.

The receptacles should then be covered with glass, raised slightly at a corner to allow ventilation, and either placed in a dark part of the greenhouse or covered with a sheet of brown paper to exclude bright light. This work should be carried out during June, July, or August.

The temperature of the greenhouse should be maintained as nearly as possible at 65 degrees F. Leaving the glass in place to maintain a high humidity around the seeds is preferable to removing it and wiping away condensed moisture each day. In about 3 weeks the seeds will germinate, and the glass and paper should be removed to allow the entry of adequate light and air.

When watering is necessary the boxes or pans should be placed in a tray of water and allowed to remain there until the water has soaked right

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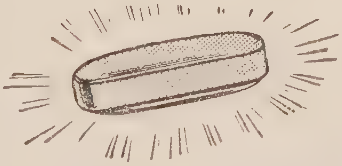

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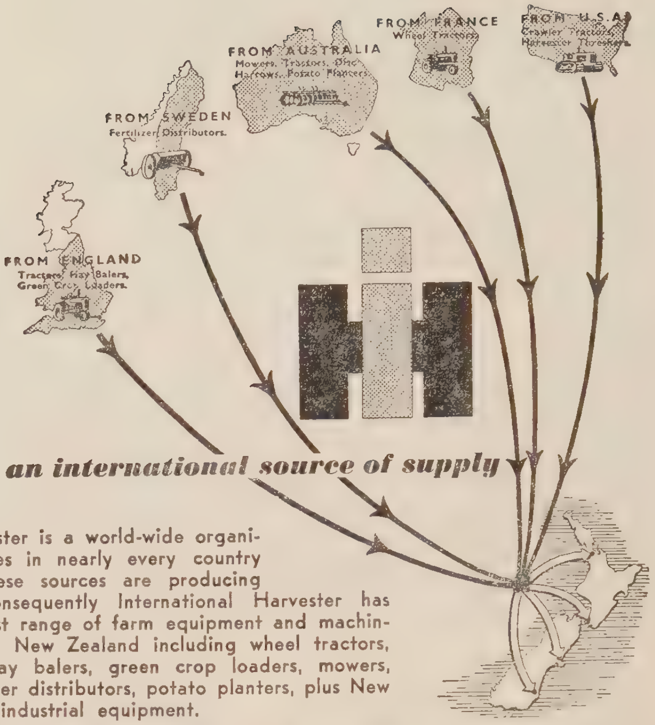
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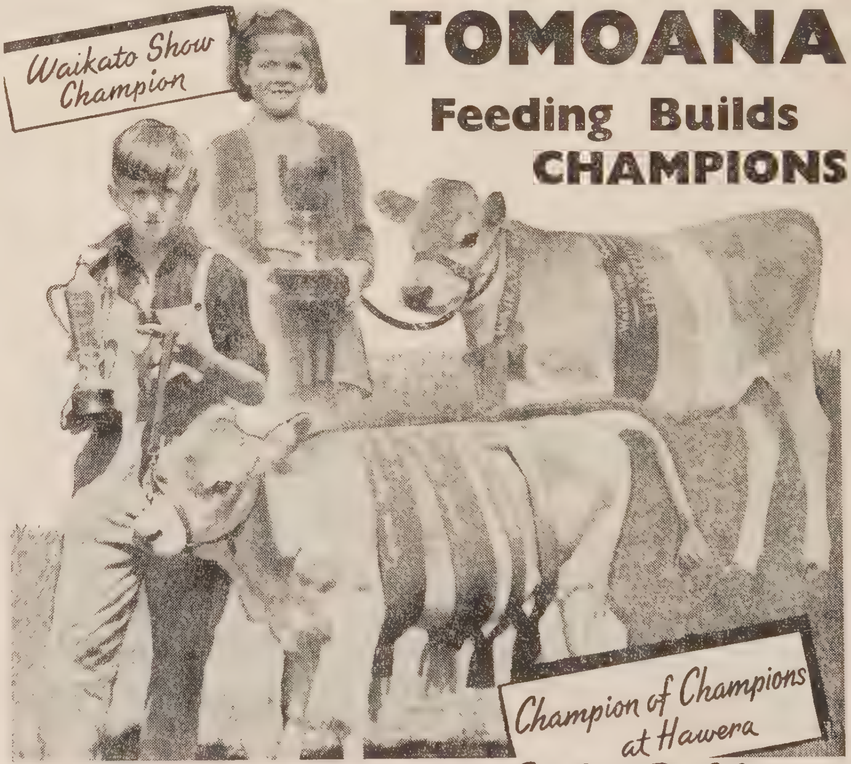
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through the soil. This method of watering ensures thorough penetration throughout the seed-box. Watering should never be done from above, as it may cause the tiny seedlings to be washed to the sides of the containers or buried by drifting soil, and the incidence of "damping off" seems to be increased by overhead watering.

Pricking out the Seedlings

The seedlings are so small that pricking them out at the seed-leaf stage is almost impossible, and the gardener is well advised to await the appearance of the second pair of leaves before attempting the task. Even at this stage the work is delicate.

The fingers cannot be used to pick up the seedlings, so a fine stick should be trimmed down with a sharp knife until it is almost flat at one end, and a small V-shaped section cut out of it. The divided end of the stick is slid beneath the leaves with the arms of the V on either side of the stem, and raising the stick lifts the seedling from the soil without injury.

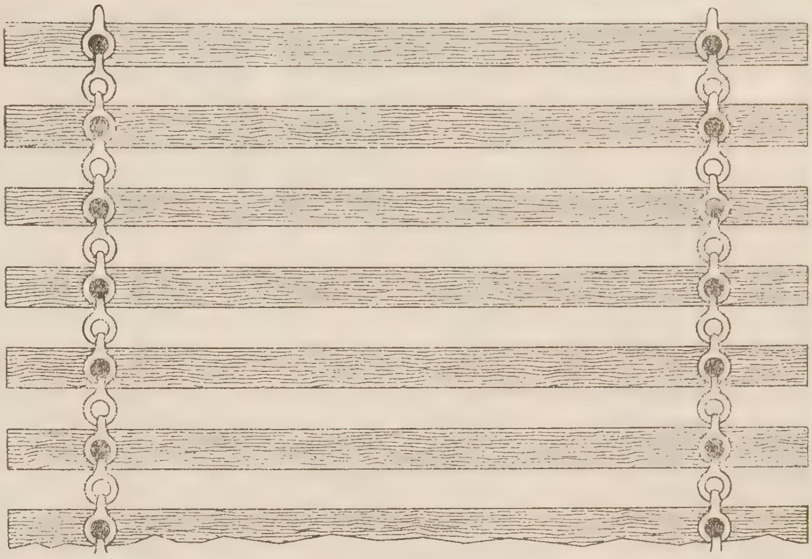
The tiny plants should be pricked out about 2in. apart in boxes. For about the next 2 months the seedlings are grown in a temperature of around 65 degrees F., and some method should be devised to protect them from direct or strong sunlight, which tends to cause scorching of the leaves.

Shading is best achieved by making blinds of canvas or wooden laths which can be raised or lowered as required over the roof of the greenhouse. The lath blind is better, for it does not stop the sun's rays entirely but rather filters them and casts shadows on the foliage; as the sun moves, so do the shadows, and thus the sunlight is not concentrated on any one part of a leaf for a long time. This type of shading prevents scorching and helps to maintain the growth rate of the plants somewhere near that most desirable.

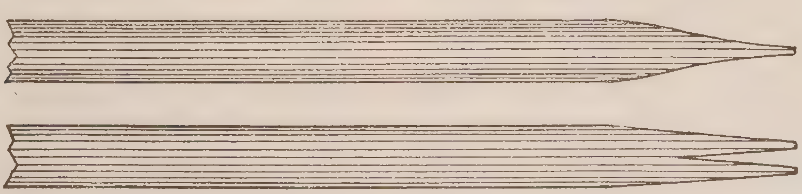
Care should be taken to remove the blinds over the glass when the sun is not shining, for begonias are relatively quick-growing plants of a rather large and succulent nature. They require a great deal of light, even though they are not very tolerant of direct sunlight.

Potting up the Small Plants

When the leaves of the small plants touch each other in the boxes it is time to pot them up into 3 or 4in. pots. The pots should be well crocked so that drainage is good. A potting mixture strongly recommended for the culture of the plants from then on can be prepared by mixing together the following constituents: 7 parts by bulk of sterilised loam, 3 parts of peat or leaf mould, and 2 parts of coarse sand, plus 1½oz. of dried blood, 1½oz. of superphosphate, ½oz. of muriate of potash, and ¾oz. of carbonate of lime to each bushel of the compost.



A lath blind such as this for shading seedlings can be constructed easily in the home workshop. White pine laths 1in. x 1¼in. are most suitable. They are attached 1in. apart to chandelier chain with bifurcated rivets inserted through drilled holes.



A small stick trimmed almost flat and with a V-shaped notch at one end is very useful for pricking out tiny seedlings.

If all goes well and the plants have no major setback, they should make their first attempt at flowering about 6 months from the time the seed was sown. During the first year of a begonia's life there is little for the gardener to do except to keep the plant growing strongly. All major cultural phases, such as limiting the number of shoots and flowers, will come in later seasons.

Growing Begonias from Tubers

Most gardeners prefer to grow their begonias from tubers. Named varieties or selected colours can be kept true only by growing on old tubers or by propagating from cuttings. The tubers should be started into growth during August or September.

The beginner may find difficulty in deciding which is the top of the tuber. Normally the top is concave and the bottom convex, so that when the tuber is held with the hollowed-out surface with the mat of dead fibrous roots upward it is in the correct position.

Before the tubers are started they must be examined thoroughly for rotted portions. If such decayed patches are found, they should be cut away, together with a reasonable margin of healthy tissue, with a sharp knife, and the wound should be dusted liberally with flowers of sulphur. Such cut surfaces should be allowed to dry thoroughly in the sun before the tuber is placed in the compost for starting.

An excellent compost for starting begonias into growth can be prepared by mixing equal quantities of well-rotted leaf mould and sharp sand. A layer of this compost about 2in. deep is spread in a box and the tubers set firmly in it with a few inches between them, checking that each tuber is right way up. More of the compost is scattered about the tubers and the general level raised until their tops are no more than ¼in. below the surface. To bury the tubers deeply is to invite trouble, for they rot readily. The whole is then firmed gently and watered lightly. The boxes are covered with newspaper or brown paper and placed in a warm part of the greenhouse. Temperatures of up to 70 degrees F. are quite safe for starting begonias, but the temperature must be reduced as growth becomes evident or the shoots will grow long and soft. In a few days small, pale-pink buds will begin to show; generally, 1- or 2-year-old tubers move before the older ones.

Immediately it becomes evident that most of the tubers have started into growth the temperature of the greenhouse must be reduced to about 60 degrees F. and kept fairly steady. On the first dull day the paper covers should be removed so that the leaves may develop freely, but care must be taken to shade the plants from strong, direct sunlight, particularly at this stage.

About 2 weeks later the roots should be sufficiently developed to warrant

Pendulous begonia Golden Shower.

the tubers being potted up. In the past it has been usual to put the plants into the smallest pot in which they can be accommodated comfortably and to grow them on with a series of "pottings on" to larger receptacles until they almost reach the flowering stage. Recent experience in growing begonias on a large scale has proved that this is unnecessary and that better results can be obtained by potting the rooted tubers directly into the pots in which they will complete their growing and flowering season. This means a great saving of time and effort and should make begonia growing an even more attractive hobby to many an amateur gardener.

As a general rule 1- or 2-year-old tubers, provided they are healthy and strong, can safely be planted in 6in. pots, or perhaps 7in. pots if the variety is particularly vigorous. Older tubers are potted up into larger pots according to their size and vigour. The potting mixture described for potting up the seedlings is strongly recommended.

Another mixture which usually gives good results can be prepared by mixing together 2 parts by bulk of good loam, 1 part of leaf mould, 1 part of well-rotted animal manure, and 1 part of coarse sand.

In the preparation of the pots care must be taken that drainage is adequately provided for, because begonias will not tolerate a wet soil. Trying to economise on crocking material is unwise, and a generous layer of coarse, fibrous, organic material should be placed on top of the crocks before any soil is put in the pots.

The pots should be partly filled with the potting mixture, which is firmed slightly by jabbing the fingers vertically into it and knocking the pots gently on the bench occasionally. Each tuber should be gently lifted from the box in which it has been started and placed in a pot, ensuring that there are no large air spaces beneath the tuber or roots. More potting soil should be scattered about and over the roots until the level of the soil is ¾ to 1in. below the rim of the pot, with the top of the tuber barely covered, if at all. If it is buried deeply, the chances are that the tuber or the bases of the stems will rot.

Subsequent Procedure

From this stage onward the secret of success lies not in a complicated series of cultural practices but in a few simple operations combined with constant care and attention.

The gardener must first decide how many stems each plant should carry, for no begonia can do its best if every bud it produces is allowed to grow away and try to carry flowers. Normally, a tuber which is small enough to be grown in a 5in. pot is not big enough to carry two heavy stems; one stem should be the limit for such tubers, and also for many in 6in. pots. Most tubers in 6in. pots can carry two stems, and in 7in. pots three should be the limit. Three stems are also adequate for tubers in 8in. pots, and only the largest of tubers, grown in 9 or 10in. pots, should be allowed to carry four stems.

As soon as the plants have settled down after being potted they begin to grow vigorously, and then is the time to select the shoots which are to be grown on. The unwanted shoots can be eliminated by cutting them off with a sharp knife. Should the spare shoots be required for propagating as cuttings, they may be left to grow until they are 3 or 4in. long.

Temperature, Humidity, and Watering

Once the stems are growing freely, temperature and ventilation of the house are the main points to be watched.

High temperatures are not necessary; 55 to 65 degrees F. is an adequate range, and if higher temperatures are maintained, the plants become weak and unhealthy.

Plenty of fresh air must be allowed to circulate about the plants without draughts being created, for the soft, fleshy leaves are particularly susceptible to fungous rots. High humidities combined with high temperatures often bring about a collapse of begonia leaves, from which the plants seldom recover.

Watering should be done with the utmost care. Begonias prefer to be rather dry than rather wet, so overwatering must be avoided. A convenient method of ascertaining whether a plant needs water is to tap the side of the pot with a wooden hammer; if the pot gives a ringing sound, the soil is usually dry, and if a dull thud results, it is usually too wet. However, with the great variation in quality of pots at present it is as well to try to improve on this method at as early a stage as possible.

With a little practice the condition of the soil can be tested more efficiently by rubbing a finger through the upper layer of the soil and withdrawing it: If little or no soil mark remains, the soil is too dry and water should be applied; if a heavy smudge of soil is left, the compost is too wet and should not be watered again for some time; if a light smear of soil is left on the finger, the condition is about correct, and the plant will probably need to be watered the following day.

Removing Side Shoots and Disbudding

Side shoots, or laterals, invariably arise on the main shoots and normally are not required. Therefore they must be removed so that they do not drain too much food from the main stem. This can be done by breaking them off or by cutting them off with a sharp knife. Where a large number of blooms is required, a few laterals may be left to grow, but usually most of the laterals are removed.

In most cases, particularly where water is insufficient and temperatures are kept unnecessarily high or low, the plants begin to throw flower buds at an early stage. These early buds should be pinched out, because the flowers will be of poor quality. This practice should be continued until the plant is considered large enough to carry its flowers or until the main show of flowers is required. The plants are not harmed by this procedure provided it is not continued later than early January, and it will be found most useful for keeping back the show period until the most desirable time.

Staking

The stems of begonias are fleshy and particularly heavy and the leaves are large. These facts make it imperative that the plants be staked. Light bamboo canes are ideal for the purpose and should be pushed well down into the soil as near as possible to the stem to be staked, but without injuring the tuber. Raffia is used to tie the stem loosely to the stake. The tie must never be tight or the rapidly enlarging stem will be restricted in its growth at that point and will snap off at the first disturbance.

Flowering

Begonias are singularly free flowering and seem always to endeavour to display about twice as much bloom as they are capable of holding up. This necessitates thinning, which is an easy and by no means unpleasant task. Every second or third bud should be removed according to the variety and its flowering habits. This should be done when the buds are at a fairly early stage of development or they take up too much of the food necessary to obtain perfection in the blooms which are left for display.

The buds that are left grow with amazing rapidity, and as the stems elongate it will be seen that each is really an inflorescence consisting of one large central flower and two smaller lateral ones. The large central one is the male and is the showy member of the bunch. The smaller side ones are females and are never particularly attractive; to enhance the appearance of the central bloom they should be removed.

The flowers are often so heavy that the stems are not able to support them and wire flower supports are needed to hold them up. Such wire supports can usually be obtained at reasonable cost from horticultural tradesmen dealing in gardeners' sundries.

As the blooms pass their best the outer petals begin to decay, and this can be taken as an indication that the time has come for their removal. If these faded flowers are taken off regularly, quality is maintained in subsequent flowers.

Light applications of liquid manure may be necessary as the plants approach the flowering stage, but this should not be overdone or weak spindly growths at the tops of the stems will result. It should be applied only to plants which obviously are pot bound. Bunches of roots growing out through the drainage hole are usually an indication of this condition.

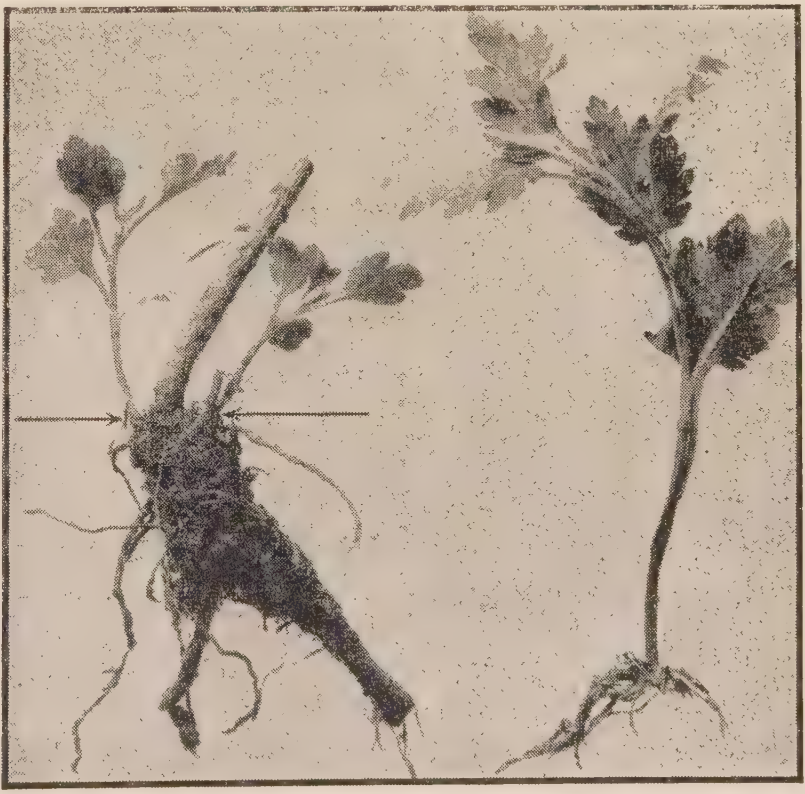
The temperature in the greenhouse should be lowered, if possible, during the flowering season to a maximum of 55 degrees F. and the water supply reduced to the minimum required to keep the plants in good condition. These factors tend to lengthen the lives of the blooms.

After Plants have Flowered

With the passing of the flowering season the now successful begonia grower undoubtedly will congratulate himself, while his mind's eye unconsciously enlarges the best bloom until it assumes the proportions of a giant Japanese chrysanthemum. Unfortunately, in the midst of his reminiscences many a gardener neglects to give his plants the proper care after they have flowered.

Immediately flowering has ceased the water supply should be decreased in very gentle stages. The tuber absorbs much of the material in the stems and leaves to carry it over until next season, and it is unable to do this very quickly. Therefore the water supply should not suddenly be stopped altogether, for this causes a sudden collapse of the stems and leaves, allowing scarcely any opportunity for the tuber to absorb nutrients.

The plants should be looked over regularly while they are dying off, and all the withered and decayed portions should be collected up and burnt. This little act of cleanliness contributes greatly toward keeping down rot in the tubers.



The arrows indicate the points at which an old chrysanthemum stool can be divided. At right is a suitable cutting for replanting.

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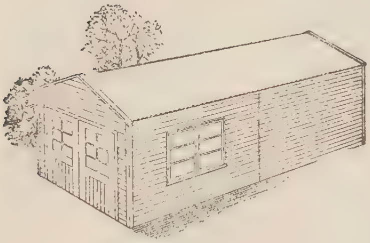

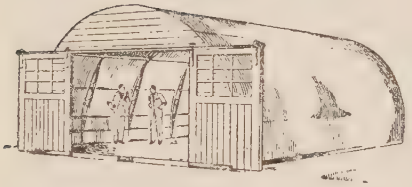

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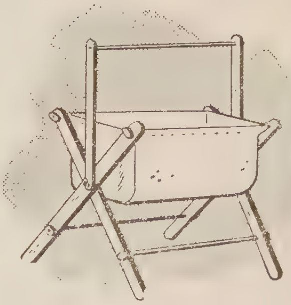

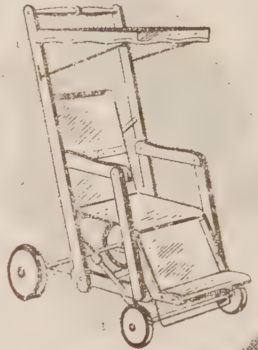

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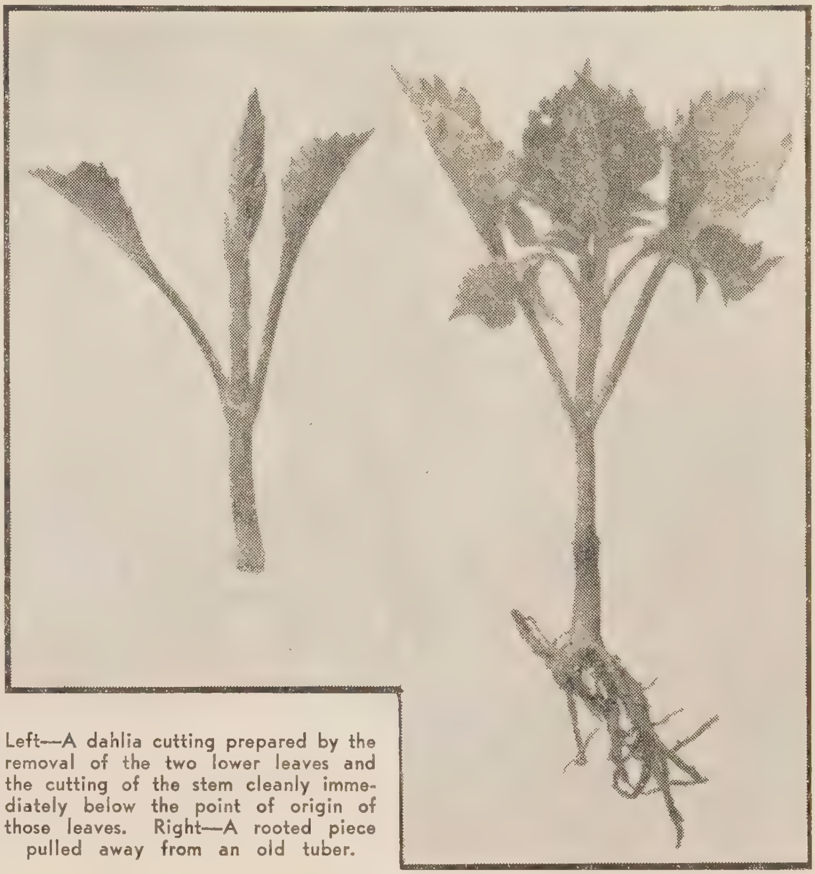


Left—A dahlia cutting prepared by the removal of the two lower leaves and the cutting of the stem cleanly immediately below the point of origin of those leaves. Right—A rooted piece pulled away from an old tuber.

When the tops have died completely the tubers can be knocked out of the pots and boxed up in light, dryish soil for winter storage. Every month they should be taken out, dipped in a bucket of warm water, dried in the air on a tray, and returned to storage. This keeps the tubers firm and fleshy. The larger tubers remain firm much longer than the smaller ones.

Propagating Begonias from Cuttings

Shoots from the tubers and laterals from the main stems may be used as cuttings to increase stocks of begonias.

The best cuttings are between 3 and 4in. long. The longer leaves should be removed, both for convenience and to reduce water loss. The cut at the base of the cutting should be made immediately below a node—that is, the point of origin of a leaf stem. The cutting should then be inserted to about a third its length in sharp sand, either in a box that can be covered with glass or in a small frame with a glass lid on a bench of the greenhouse. In either case the cover over the cuttings should never be completely closed but should be held up ½in. or so at a corner to allow free ventilation. The cuttings should be shaded from strong light.

Three weeks to a month is the usual period required by cuttings to root, and when the roots are big enough the little plants should be potted up to 3 or 4in. pots. They grow rapidly in the right conditions and soon require to be potted on to 5in. or possibly 6in. pots, in which they should be allowed to flower and complete the season. Particular care must be taken with these new plants during the drying-off period or the tiny tubers may be lost.

Begonias can be propagated quite freely from leaf cuttings. Though it is not a method that will produce flowers in the first season, it is an excellent one for increasing stock quickly.

A mature leaf is cut from a plant with 2 to 3in. of the stem attached. The stem is inserted in sand and the blade of the leaf left above it. Seldom will any activity be apparent, but after the leaf has died at the end of the season the stem will be found to have rooted and a tiny tuber will have formed at its base. Storage of these tubers is rather difficult, and they should be kept in an accessible place where they can be examined frequently and given a dip in warm water whenever they feel soft. These newly propagated tubers can be started in spring in the normal way.

Growing Begonias Outdoors

For begonias to be grown for outdoor display the same starting and early growing procedure is followed. Before the tubers are planted out the temperature of the greenhouse should be reduced gradually to about average outdoor temperature or, if the facilities are available, the plants should be given a brief hardening-off period in a cold frame.

The tubers may be planted out directly from the boxes if they are well rooted and have developed well beyond the bud stage. An alternative and much the more satisfactory method is to grow them on in pots for a while and then plunge them in their pots in the outdoor bed. The advantages of this method are that planting out can be delayed until conditions are warm and that the tubers can be found easily when the season is finished.

Shade is essential for the well-being of begonias outdoors, so dry, sunny positions should be avoided. The fact that they are shallow-rooted plants makes this doubly important.

Begonia leaves always assume a set position, so that the plant appears to have a back and a front. It is advisable to have all the plants in a bed facing the front.

Window and porch boxes can be used for begonia growing if they are in reasonably shady places, and baskets can house the many gloriously coloured pendulous varieties.

Garden Work for September

Annuals of the hardier types can be sown in open beds in September if the soil is not still too wet. The top few inches of soil should be cultivated, all lumps broken down, the soil trodden fairly firm, and the surface raked until it is uniform. Seed is far better sown too thinly than too thickly. An ⅛in. sieve can be used to spread a light covering of soil over the seeds—not more than four times as thick as the diameter of the seeds. For satisfactory results the seed-bed must be firm. Among the many annuals that can be treated thus are alyssum, marigolds, candytuft, cornflowers, clarkias, godetias, cosmos, larkspur, and night-scented stocks. Other annuals which are less hardy can be raised in the manner described in the article on raising bedding plants in last month's "Journal." Seeds that should be sown during September for raising in this way are African marigolds, schizanthus, zinnias, charieis, *Lychnis haageana, Perilla nankinensis,* capsicum, dimorphotheca, and ursinia.

Bedding plants raised from earlier sowings of seed can be planted out in September in most districts, though where late frosts are likely such tender types as salvias and zinnias should not be planted out until the following month. Bushy plants with plenty of strong, green foliage are the best for bedding purposes, and any flowers or buds present should be cut off to encourage branching and better flowering at the required time. Plants that have been in their boxes too long tend to become long and spindly and have yellowed foliage as a result of partial starvation. Such plants are never satisfactory.

Bulbs which have flowered early in the season may still carry a mass of foliage which is perhaps a little untidy, but the gardener should not yield to the temptation to cut it off. To do so is to deprive the bulbs of the food which is necessary to complete development and can result only in smaller bulbs and poorer flowering next season. In the herbaceous borders the masses of bulb foliage can be made tidy by tying the leaves into neat bunches.

Chrysanthemums can now be lifted and divided and rooted pieces replanted. Cuttings may be taken and set in sand in a cold frame to root. A cutting should be about 3 to 4in. long, have the lower leaves removed to reduce transpiration, and be cut cleanly at the base immediately below a node or point of origin of a leaf. Cuttings should be kept moist at all times and be shaded from bright sunlight. After about 3 weeks the buds at the tips begin to produce new green leaves, and this can be taken as an indication that root formation is well advanced. When this stage is reached the shading should be removed and the lid of the frame opened up or taken off. Shortly after that the plants may be potted up or planted straight out into the borders.

Dahlias which were boxed for starting in August should be producing shoots around the necks of the tubers the following month. When these shoots are growing well the plants may be increased by either of two ways: The clumps of tubers can be divided carefully by pulling them apart, care being taken to ensure that there is a healthy shoot attached to each piece of tuber; or plants can be propagated readily from cuttings. A shoot for a cutting should be cut off immediately below a pair of leaves about 3in. from the tip, the lower leaves removed, and the cuttings inserted 1in. deep in finely sieved river sand in boxes and as close together as they will go without being crushed. The boxes should be placed in a greenhouse or cold frame for the cuttings to root. In most districts the cuttings can safely be planted directly into the borders as soon as they have rooted well.

Gladiolus corms after being husked. The corms should be cleaned thus and inspected thoroughly for rotted portions before being planted.

Gladioli are usually planted in numbers in most districts in September. When the corms are removed from store they should be examined thoroughly, and this can be done satisfactorily only by removing the husks. If any patches of rot are apparent, they should be cut cleanly away with a sharp knife. Badly infected corms should be burnt. Flowers of sulphur should be scattered over all cut surfaces before planting is begun. In heavy soil the corms should not be planted more than 3in. deep, and in light, friable soil not more than 6in. deep. The recommended distance between corms is 8in.

Herbaceous perennials often throw up a great number of shoots at this time of year, and if all these are allowed to grow, only a mediocre show of flowers can be expected. The shoots should be thinned out severely until only a few remain. All planting of new perennials should be completed in September.

Hydrangeas should be pruned now in cold districts or where the work was not done during autumn. All last season's flowering stems should be cut out and all new shoots left uncut, as the new flower buds are borne at the tips of these. Two handfuls of blood and bone scattered about the roots of each of the bushes in September should prove beneficial. It should be forked in very lightly with a hand fork.

Lawns should be given their spring dressing of fertiliser during September. The best dressing is a mixture consisting of 3 parts by weight of sulphate of ammonia, 1 part of superphosphate, and 1 part of sulphate of iron, applied at the rate of 1oz. per square yard.

Pot plants indoors or in a greenhouse should receive attention now. A plant in need of new soil can be removed from the pot, the crocking material taken away from the base, as much soil as possible scraped away without damaging the roots too greatly, and the plant repotted into a pot of the same size or only very slightly larger. Where the need for repotting is not so great the top inch or two of soil can be scratched away and emptied out and fresh potting soil substituted.

Rose pruning will now have been completed in all districts, and the beds should be given a topdressing of well-rotted manure, compost, or leaf mould to help retain moisture during summer.

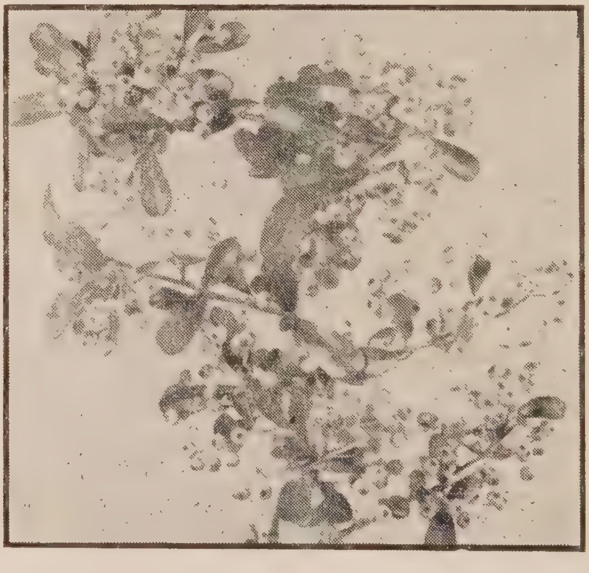
Pyracantha coccinea

AS *Pyracantha coccinea*, an attractive evergreen bush, is closely related to the *Crataegus*, it is often referred to as the "evergreen" or "firethorn". If left to its own devices, it will grow from 10 to 15ft. high, but if pruning is considered necessary, it may be carried out in spring when the berries are past their best. After flowering this variety produces clusters of coral-red berries throughout late winter and early spring.

P. coccinea thrives in almost any soil but cold, heavy clay and prefers a sunny position in a shrubbery or against a wall, as it berries more freely when the growth is properly ripened by the sun.

It may be propagated by seeds or cuttings. Seeds should be sown under glass when ripe, or they may be put in pots or boxes outside in autumn and kept there until they are removed to a warm greenhouse or frame in spring. Cuttings from firm, well-ripened, young growth can be inserted in sandy soil in a glasshouse or glass-covered frame, box, or pot in January or February. The plants are said to be difficult to transplant, so they should be grown in pots or transferred to their permanent positions while quite young.

—*H. P. THOMAS, Vegetable Instructor,*
Department of Agriculture, Wanganui.



Appetising and Nutritive Dishes Made with Eels

By NELL MACPHERSON, Rural Sociologist, Department of Agriculture, Auckland.

THE eel merits much greater attention than it at present receives from New Zealand housewives, for eels are high in nutritive value, being a particularly rich source of vitamins A and D. They are also a good source of high-quality protein and provide energy. In inland areas where fish is difficult to get except on the occasion of a visit to the local centre, eels can make the fish dish on the menu and help to provide the vitamin D which is necessary in the diet.

FRESH-WATER eels are readily obtained from September to April and when prepared and cooked properly have a rich flavour and delicate texture. It is in fact the preparation which is most important, for careless preparation is probably responsible for much of the prejudice against the use of eels in the menu.

Selection, Preparation, and Cooking

Points to observe in the selection, preparation, and cooking of eels are:—

1. Use eels from clear streams or the flesh may have a muddy flavour.
2. Select a method of cooking that will add to the flavour, as the flesh may be somewhat insipid. This would be advisable when introducing eel dishes to the menu, as it would disguise the "different" flavour.
3. As eel flesh is oily, use an acid food such as lemon juice or tomato as part of the main dish, in a sauce, or served with the fish.
4. If frying eel, be sure the fat is sufficiently hot for cooking and drain the cooked fish well.
5. Servings should be relatively small, as the food is rich. Serve with slices of lemon.
6. The fish should be skinned before use, the following method being recommended.

Skinning

Immerse the eel in scalding water for 5 minutes. (When scalding the eel be very careful, as the eel retains its reflex actions for some time after death and will probably jerk and splash the water. It is often wiser to scald it in a tin or bucket and to use a heavy wooden lid or piece of board. Place the eel in the bucket and the board on top, leaving an opening to pour in the water. Close the gap immediately.) Allow the eel to cool a little and then remove the skin as follows:—

Gut the eel, make a hole through the tail, and hang the eel on a nail or hook. Then with a sharp knife cut the skin round the eel below the nail hole. Grip the skin on either side at the cut edge and remove it with a quick, strong downward pull. If a piece of burlap or sugar bag is used, a better grip is obtained.

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Stewed Eel

1½lb. of eel
2 cups of stock
½ lemon
1 onion
2 or 3 cloves

Wash the eel and cut it into pieces 2 or 3in. long. Dredge with flour, pepper, and salt. Have the stock boiling, add the eel, onion, cloves, and a piece of lemon peel, and simmer the mixture for ½ hour or more. Take out the fish and strain the gravy. Return the gravy to the pan, thicken it with flour, and boil it for 2 or 3 minutes. Chopped parsley may be added. Add the lemon juice and the fish. Heat through thoroughly again and serve.

Roast Eel

Cut the eel into steaks 1in. thick and place on a cake cooler in a roasting dish. Place in a moderate oven (325 degrees F.) and cook for 2 hours. Serve with lemon and mint, lemon and parsley, tomato, or mayonnaise sauce, which can be made as follows:—

Lemon and Mint

1 tablespoon of chopped mint
1 teaspoon of sugar
Juice of two lemons
Pinch of salt, shake of pepper

Put the mint in a jug. Add sugar, salt, and pepper. Cover with boiling water. Leave to cool. Add the lemon juice just before serving.

Lemon and Parsley

Prepare the lemon and mint sauce and add 2 tablespoons of chopped parsley.

Tomato Sauce

¾lb. of tomatoes
1 carrot
¼ pint of stock or water
¼ teaspoon of mixed herbs
2 onions
2oz. of butter or dripping
1 teaspoon of arrowroot or cornflour

Melt the fat. Add the chopped onion, mixed herbs, chopped carrot, stock, and cut tomatoes. Cook for ½ hour. Put through a sieve. Thicken with arrowroot mixed to a smooth paste with stock. Add salt and pepper to taste.

Mayonnaise

½ teaspoon of mustard
1 teaspoon of salt
1 teaspoon of sugar
Cayenne pepper to taste
1 egg yolk
1 tablespoon of lemon juice
1 tablespoon of vinegar
1 cup of vegetable oil

Mix the dry ingredients, add the egg yolk, and when it is well beaten add ½ teaspoon of vinegar. Add olive oil, drop by drop, beating constantly until the mixture becomes thick and smooth; then add the lemon juice and the vinegar alternately with the oil until all is used, beating the mixture constantly.

Soused Eel

2lb. of eel
2 onions
½ teaspoon of mixed herbs
Vinegar
¼ teaspoon of nutmeg
1 teaspoon of butter
Salt and pepper to taste

Cut the eel into neat pieces. Lay it in a small baking dish with finely chopped onions, the mixed herbs, nutmeg, pepper and salt, and chopped butter, and cover it with the vinegar. (If the eel is to be served hot, use half vinegar and half water.) Cover the dish and cook the eel in a moderate oven until it is tender.

The dish may be served hot or cold.

Fried Eel

Cut the eel into ½in. slices. Dip them into slightly beaten egg and roll them in oatmeal or fine breadcrumbs. Fry the pieces in deep fat for 2 to 5 minutes. Drain them well and serve with sliced lemon.

Mock Whitebait

Shred the flesh of an eel. Dust with sufficient flour to separate the pieces. Cook the shreds in batter for several minutes in a hot pan. Serve with sliced lemon.

Baked Eel

Split the eel after skinning it, remove the backbone, and cut the flesh into convenient lengths. Place the

[*Sparrow Industrial Pictures Ltd. photo.*

Turning jellied eel out of the mould.

RECIPES FOR EEL DISHES

[*Sparrow Industrial Pictures Ltd. photo.*

Preparation of curried eel.

flesh in a baking dish. Pour over it 1 egg well beaten and mixed with a cup of milk. Sprinkle breadcrumbs on top of the mixture and bake until it is golden brown. Serve with green peas and lemon slices.

Eel with Tomatoes

Eel with tomatoes is a very suitable way of using fillets from a large fish.

Butter a pie dish or casserole and fill it with fillets of eel and slices of tomato in alternate layers. (Onion may be added if desired.) Lightly pepper and salt each layer. Cover the top with fine breadcrumbs and put little dabs of butter over it.

Bake in a moderate oven (325 degrees F.) for 45 minutes.

Curried Eel

1lb. of cooked eel
1oz. of curry powder
1 apple
1 lemon
A little butter or fat
1 onion
1oz. of flour
1 pint of fish stock
Salt to taste

Chop the apple and onion finely and mix them. Melt the fat in a pan and fry the mixed onion and apple lightly. Add the curry powder and the flour. Cook lightly, then stir in the fish stock slowly to prevent lumps from forming. Add the lemon juice and salt and bring the mixture to the boil. Simmer for ½ hour. Strain the gravy and return it to the pan. Add the fish cut into dice and simmer it gently for a few minutes. Serve at once with boiled rice. (If rice is not available, boiled macaroni is a suitable substitute.)

Fish Casserole

Cut the eel in slices, season it well, and put it in a casserole with sliced tomatoes and onions. Add sufficient milk to cover it and bake in a moderate oven (325 degrees F.) for ¾ to 1 hour.

Cold Dishes

Jellied Fish Salad

2 eggs
1 teaspoon of salt
½ cup of cold water
½ teaspoon of sugar
2 cups of cooked flaked eel
1 tablespoon of granulated gelatine
¼ cup of vinegar

Beat the eggs well and add the salt, vinegar, sugar, and water. Cook the mixture over boiling water until it thickens. Soften the gelatine in cold water and add it to the hot dressing. Add the fish. Place the mixture in individual moulds or in one large mould; stand it in a cold place until set. Turn the dish out of the mould and place it on crisp lettuce leaves. Garnish with tomato slices and serve with mayonnaise or boiled salad dressing. The ingredients given make sufficient fish salad for 4 people.

Jellied Eel

2lb. of eel
1½ quarts of water
1 teaspoon of salt
Lemon rind
1 teaspoon of chopped parsley
1 onion stuck with 3 cloves
¼ teaspoon of mixed herbs
Salt and pepper to taste

Cut the eel into slices. Place it in a saucepan and add the water, salt, and onion. Cover it and simmer it until it is cooked. Place the fish in a mould in layers, putting parsley, herbs, and grated lemon rind between the layers. Boil the liquid until the quantity is reduced to 1 pint. Remove the onion and add salt and pepper to taste. Pour the liquid over the fish and leave the mixture to set. Turn it out when cold and serve it with a salad, watercress, or celery and parsley and lemon butterflies. As a variation set the mixture in a ring mould and fill the centre with cooked green peas when it is turned out of the mould.

Any of the usual recipes for serving fish, for example steaming, boiling, and baking, can also be used for cooking eels. The eel can be served with any tasty sauce, but as it is a fatty fish, it is better served with acid sauces.

☆

Aluminium Cooking Equipment

ALUMINIUM has been used for the construction of cookery equipment for more than 60 years and when proper precautions have been taken in the use of good-quality utensils it has been found to be among the most satisfactory of the materials available. Yet at times, especially during the period 1928-35, serious objections were raised to its use. Supposedly accurate scientific evidence was produced to show that aluminium absorbed by food was harmful to health, and these allegations were naturally exploited by manufacturers of utensils made of metal other than aluminium.

Though subsequent research has provided evidence in favour of aluminium, the prejudice against it was great and even today there are still those who hesitate to buy aluminium utensils because they imagine they may have harmful effects on health.

Minute Amounts Dissolved

Aluminium does react with some foods, particularly with markedly acid or alkaline ones, but in normal cooking processes only minute amounts are dissolved. For example, the black stain which forms when washing or baking soda solutions or eggs are boiled in aluminium saucepans is caused by minute amounts of iron present in the aluminium as an impurity (only 0.4 or 0.5 per cent.). The iron reacts in the presence of aluminium with the soda or with the lime from the egg shell, and, according to the amount of iron present, the stain may be more or less marked. It is, however, quite harmless and dissolves readily if acid foods are cooked in the saucepan or when it is cleaned.

Even under the most acid conditions likely to occur in food only about a tenth as much aluminium is present as is present in scones or breads made with baking powder containing aluminium. In the U.S.A., where these baking powders were in common use, people consuming foods made with them remained in good health over many years.

No Effect on Health

The facts given, together with the results from many carefully controlled experiments with animals, show conclusively that the maximum amount of aluminium which food is capable of absorbing during normal cooking procedures has no effect on health.

However, aluminium-ware should be given the same care as other types of cooking utensils if maximum efficiency is desired. Special precautions include avoidence of any alkaline substances such as baking and washing soda when cooking (alkalis are responsible for the blackening which occurs) and of constant use of steel wool for cleaning, as small particles of steel become embedded in the metal and add to the effects of the iron already present as an impurity. Aluminium containers, like those of other metals and tins, should not be used for storing liquid or salted foods, as eventually corrosion, dulling, and pitting of the surface will occur.

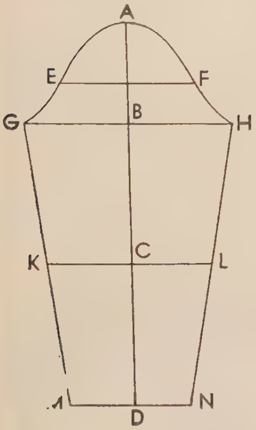
If reputable brands are purchased and reasonable care is taken in their use, aluminium pans will give good and safe service for many years.

—*EVELYN E. MOORE, Rural Sociologist, Department of Agriculture, Auckland.*

MAKING SLEEVES

THE less experienced home dressmaker often finds difficulty in making the sleeves of garments. This article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Timaru, and its illustrations are intended to help women to handle the problems of sleeve making successfully.

TO avoid difficulties in fitting, the measurements of a sleeve pattern should be checked before the pattern is used for the first time. The measurements used in producing sleeve patterns differ from one pattern company to another, and individual measurements vary so much that the pattern selected may not prove a good fit. If any seams are allowed on the pattern, such allowances must be deducted when the size is being tested.



A plain sleeve pattern showing where measurements should be checked.

The diagram on the left shows a plain long sleeve. The line AD represents the outer arm measurement, taken from the shoulder bone round the bent elbow to the wrist at the little finger line. The length from shoulder to elbow (AC) and elbow to wrist (CD) should be checked at the same time. Alterations in size may be made by slashing and spreading the pattern to enlarge it or overlapping to decrease the size, as described in the article "Preparing and Adapting Dressmaking Patterns" on page 403 of the "Journal" for April, 1948. Taking measurements was described under the heading "Measuring and Fitting for the Home Dressmaker" on page 633 of the June, 1949, issue.

The inner arm measurement from the tendon at the front of the shoulder to the wrist at the thumb line corresponds to the lines GM and HN on the diagram. Width measurements should be checked at wrist (MN), adding ½in. extra for ease, and elbow (KL), using the measurement round the bent elbow and allowing 1in. for ease.

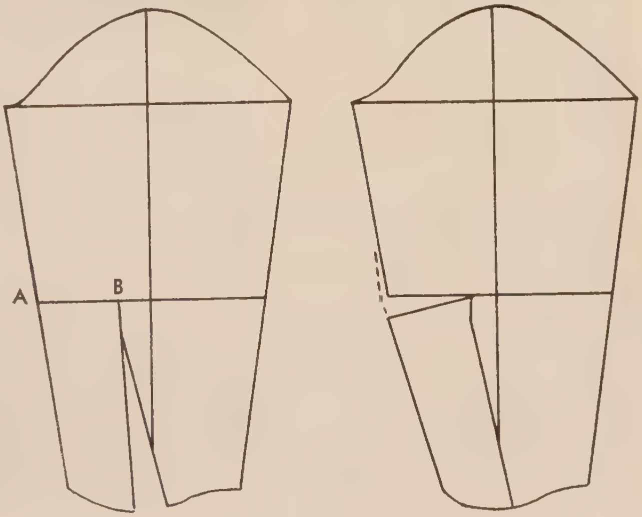
An important width measurement is the base of the cap line (GH). The sleeve cap is the portion above this line. This measurement is taken with the tape horizontally round the arm, high up under the armpit, and 1½in. for ease should be added to it on the pattern. If the tape is left pinned round the arm here, the height of the cap may be taken using another tape, measuring from the shoulder bone to the bottom of the tape round the arm (AB). The width of the cap should be checked again at the level of the tendons joining the arms to the body (EF) 1½ to 2in. above the base of the cap line.

On the pattern these points are where the outward curve over the top of the sleeve changes to the inward curve under the arm. Notches are usually marked at this point. The measurement from tendon to tendon should be increased by 1½in. for ease. On the pattern the back part of this line measuring from the centre line (AD) should be ¼in. longer than the front; that often provides a means of deciding which is the back and which the front of a badly marked pattern. When a sleeve is folded in halves lengthwise the wider portion at this level may be seen readily and that is the back. Sleeves which are full at the top are likely to have a greater height-of-cap measurement, and those full at the wrist may have a longer elbow-to-wrist line measurement. Even a plain sleeve may have ½in. added to the length just back from the centre line, and the wristline curved. Full sleeves may have all or only some of the width measurements increased, depending on style.

Plain, Fitting Sleeve

The pattern for a plain, fitting sleeve will appear much as in the first diagram, but probably will have a wrist or elbow dart to fit the lower sleeve to the arm. If desired the dart may be moved from one position to the other as shown in the diagrams below. The wrist dart should not take out more than 3in. of material; if more requires to be fitted out at the wrist the fitting may be done at the seam.

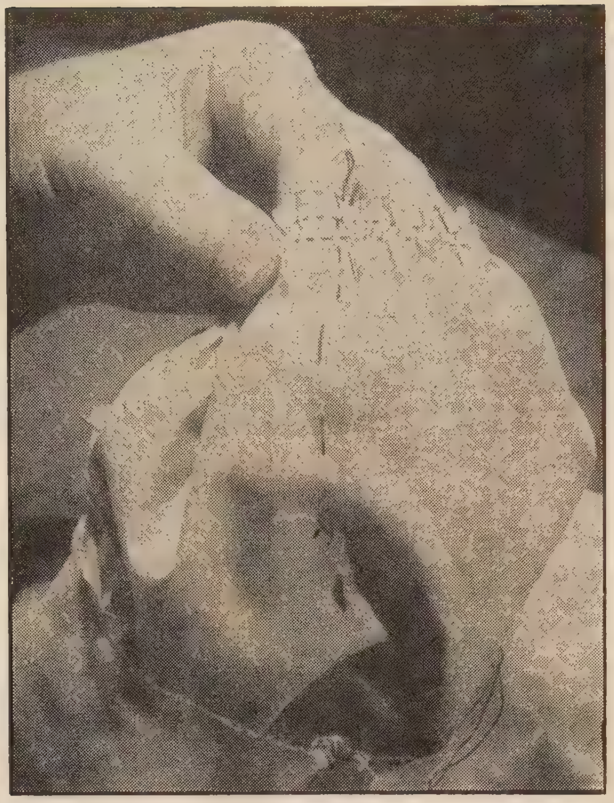
Sometimes two or three small elbow darts are used in place of one larger dart. Elbow darts are limited in



Altering a wrist dart to an elbow dart. Left—Cut out the dart and slash the pattern almost to the line at elbow level. Slash from A to B. Right—Swing the lower left piece of pattern round to close the wrist dart. This leaves a dart at the elbow. The dotted line is the new cutting line.

[New Zealand Wool Board photo.

MAKING SLEEVES



[*Campbell Photography photo.*

Pinning in a sleeve. The right sides of the garment and sleeve are together. The garment is wrong side out, with the wrong side of the sleeve showing through the armhole. Distribution of gathers or ease can best be controlled by holding the parts to be joined in the left hand with the sleeve uppermost. The double row of gathering stitches round the top of the sleeve and the vertical straight-grain line can be seen. The notch (cut outward, never into the seam allowance) at the left is one of the marks between which the gathers are to be arranged.

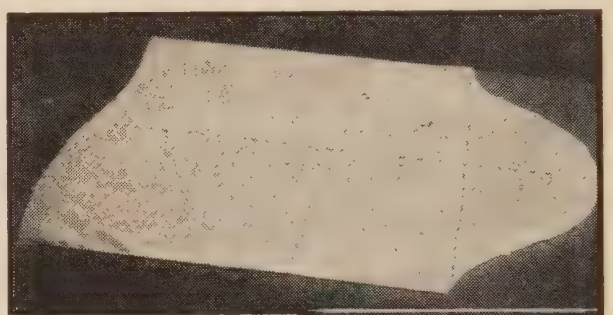
size, for they must be short. Some patterns of plain dress sleeves have one seam eased on to the other at the elbow instead of darts. When darts are provided for they should be made before the lengthwise seam. In many factory-made garments the sleeve is joined to the garment before the sleeve is made so that sleeve and underarm garment seams are sewn in one operation. Though that saves time in the making of overalls or pyjamas, in which fit is not important, it is not a good practice for dresses and other outer garments in which the fit needs to be good. Best results are obtained by setting in the sleeve after the shoulder and underarm garment seams have been made and the long sleeve seams sewn. All seams should be pressed as they are finished and before they are crossed by another seam.

When the top of the sleeve is eased or gathered, a double row of gathering stitches ¼in. from the edge of the material and ¼in. apart gives best results. Either hand running stitches may be made using double thread and a knot and a backstitch to start, or the stitches may be gathered by machine, using a very large stitchand loosening the tension; both threads are pulled together. In some designs darts instead of gathers are used to fit the sleeve over the shoulder; these darts should be fitted, sewn, and pressed toward the top of the shoulder before the sleeve is set in.

To pin in the sleeve have the garment inside out and the sleeve turned right side out. Slip the sleeve into the garment, matching the underarm seam of the sleeve with the underarm seam of the garment, and pin them. Match and pin the two pieces at the back and front notches, and match the mark at the top of the sleeve with the shoulder seam. Make sure the back of the sleeve is pinned to the back of the garment; that should not be difficult if the pattern carried distinctive marks for matching and if those marks were transferred to the material. If the sleeve had no marks, the back can be found as described earlier. Pin sleeve and garment together all round the armhole, using plenty of pins, and pinning at right angles to the seam line. Pull up the gathering threads to fit the sleeve to the garment and distribute the gathers as directed by the pattern. Usually most of the gathers are arranged over the top and slightly toward the back of the shoulder. Easing or gathering is more readily controlled when the garment and sleeve are turned back over the left hand so that the gathers or eased part are on top.

After pinning the sleeve use fairly small stitches to baste it in position. When both sleeves have been done, remove the pins and try the garment on. The lengthwise straight grain, marked on the material by a line of basting thread before the pattern is removed, should appear as a vertical line from the end of the shoulder seam when the arm is hanging relaxed at the side. The base of the cap line should be on the crosswise straight grain and should be horizontal when the garment is on the figure. If the lengthwise straight grain is not vertical, the top of the sleeve must be ripped out and refitted. Also check the armhole seam for position, ease of movement, and neatness of fit. If all is satisfactory, the sleeve may be sewn in by machine, the eased or gathered sleeve being kept on the bottom and the garment on top.

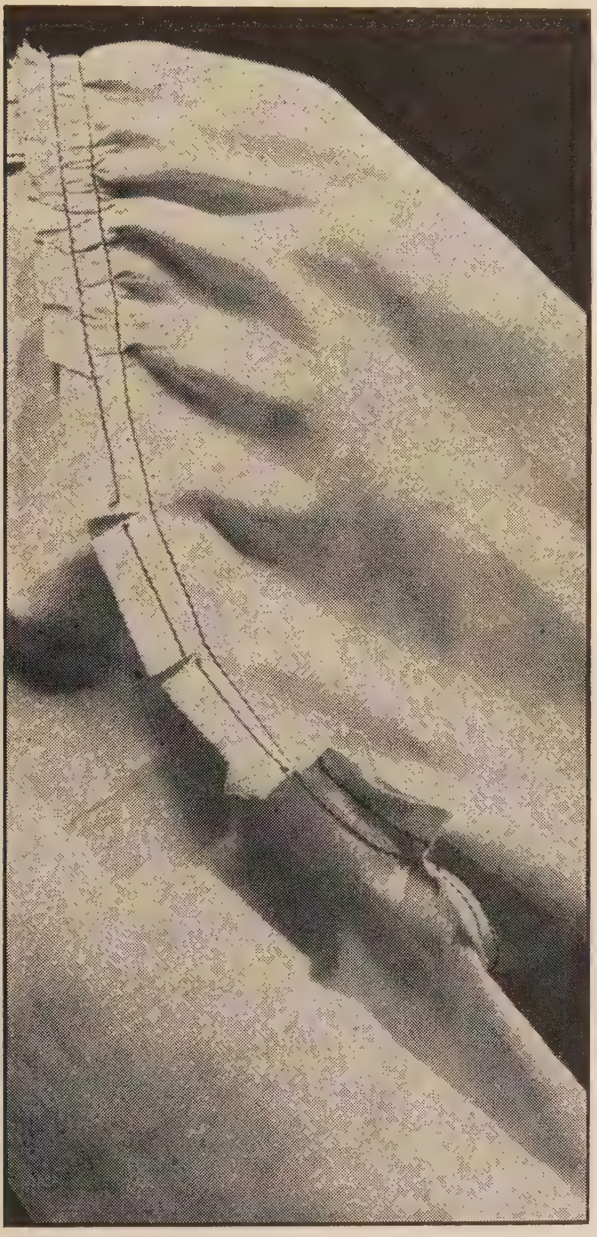
When the basting stitches have been removed the seam allowance should be clipped almost to the machine stitching at the notches at either side; above these points the



[*Campbell Photography photos.*

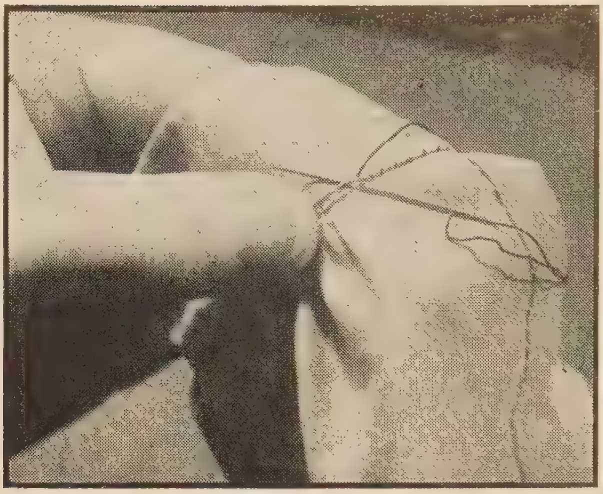
Above—Lines of basting stitches mark the vertical straight grain lengthwise down the sleeve and the horizontal straight grain at the base of the cap. Right—The vertical and horizontal straight-grain lines after the sleeve has been attached to the garment.

seam allowances should be turned over on to the body of the garment. If necessary, clip the seam allowances at intervals all round the armhole to allow them to lie flat against the garment. Do not clip quite to the machine stitching. The seam allowances may be caught at the shoulder seam with a few hand stitches to ensure that they remain turned over against the garment. The part of the seam which lies under the arm when the garment is worn is not turned over but is allowed to stand up or fall over during wearing. The seam may be finished by a second row of machine stitching about ¼in. from the first and the raw edges trimmed and overcast if necessary. If shoulder pads are used, they are attached after the seams are made and pressed.



[*Campbell Photography photo.*

The sleeve stitched in. The seam is turned over on to the garment down to the notches and clipped so that it will lie flat.

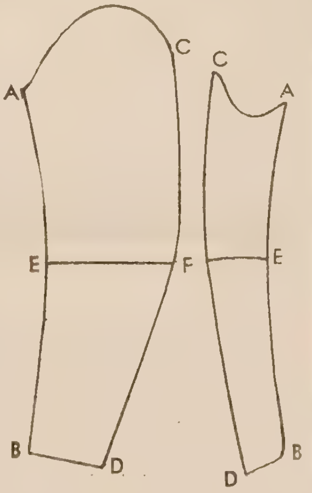


[*Campbell Photography photo.*

The needle in position for making the next stitch in attaching a cuff. The needle is slipped under one of the machine stitches and into the folded edge of the cuff. No stitches are visible on the right side of the cuff. Usually the thread would match the fabric, but dark cotton has been used to show up the stitches.

Two-piece Sleeve

The pattern pieces for a two-piece sleeve are shown in the diagram on the right. This sleeve is used for tailored garments. The two lengthwise seams are sewn first. The upper arm piece is usually eased on to the lower arm piece at the elbow on the little finger seam line. Elbow level is at the lines **EF** in the diagram. Neither of the two seams is matched to the underarm garment seam when the sleeve is set in; they are joined to the garment at or about the points where the back and front tendons join the arm to the body. Any reliable pattern will have those points marked by notches, or they can be located by fitting the sleeve on the figure. The sleeve cap should fit smoothly and snugly, and the lengthwise straight grain should be vertical as for the one-piece plain sleeve.



Pattern pieces for a two-piece sleeve. AB is the inner arm measurement and CD the outer arm. The elbow line is marked by horizontal lines.

When a two-piece sleeve is used for woollen or worsted garments any excess fullness at the top of the sleeve is usually shrunken out by judicious pressing under a damp cloth to mould the sleeve over the curve of the arm and shoulder.

Short Sleeves

The long-sleeve pattern may be shortened as desired to make short sleeves or three-quarter-length sleeves. Usually the sleeve is cut straight across at the appropriate place, but special designs may be shaped. A commercial short-sleeve pattern should have its measurements checked as for the upper part of a long sleeve.

FINISHING SLEEVE EDGES . . .

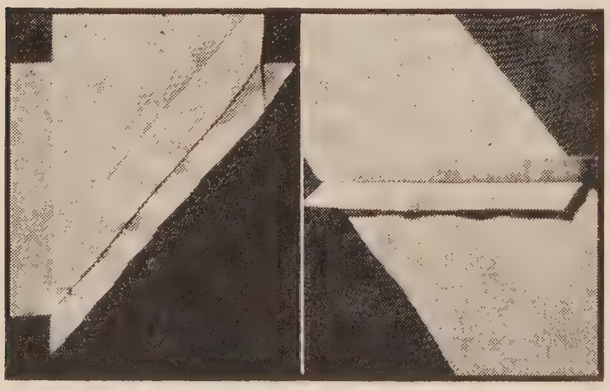
If the lower edge is straight, it may be turned in and hemmed, using very inconspicuous stitches. If the edge is curved or the sleeve fits closely, a bias facing may be used. The facing is stitched on by machine, right sides of the material together, and turned to the wrong side, ensuring that no part of the facing is visible from the right side. The raw edge is turned in and hemmed.

Sometimes the design of the sleeve calls for a fitted facing. The facing is cut exactly the same as the lower part of the sleeve and of a suitable width; it should not be too narrow. Especially if the fabric is thick, an inside facing may be cut very slightly smaller than the lower edge of the sleeve and an outside facing a little larger. The seam joining the ends of a fitted facing should be made before the facing is attached to the sleeve. This seam should lie over the sleeve seam when the facing is in position. If a contrast or trimming is desired, the facing may be stitched inside the sleeve, right side of the facing to the wrong side of the sleeve, and turned to the outside, the raw edge being folded under and stitched down to the sleeve; otherwise the facing is attached as described for a bias facing.

Cuffs may be used to finish sleeves. They may be cut on the straight or bias, the width, length, and shape depending on the style desired. Sleeves are usually gathered or pleated into wrist cuffs. The fullness may be used in this way instead of being fitted out in a dart, or extra fullness may be added. Usually a placket is required if a cuff is used to finish a long sleeve. Making plackets will be described in a separate article.

[Campbell Photography photos.

Cutting and joining bias strips. Above—The fabric folded and marked. The selvedge is pinned parallel to the straight edge obtained by tearing the material across. Cutting lines for strips of suitable width have been ruled parallel to the diagonal fold. Below—Left: The position in which two bias strips are joined. Right: The strip with the joining seam pressed open. Before it was used the projecting ends of the seam allowance (lower left and upper right) would be trimmed off.



[Campbell Photography photo.

Some of the fullness of the seam allowance is clipped out to make the finished seam less bulky. Clipping should stop short of the line of stitching.

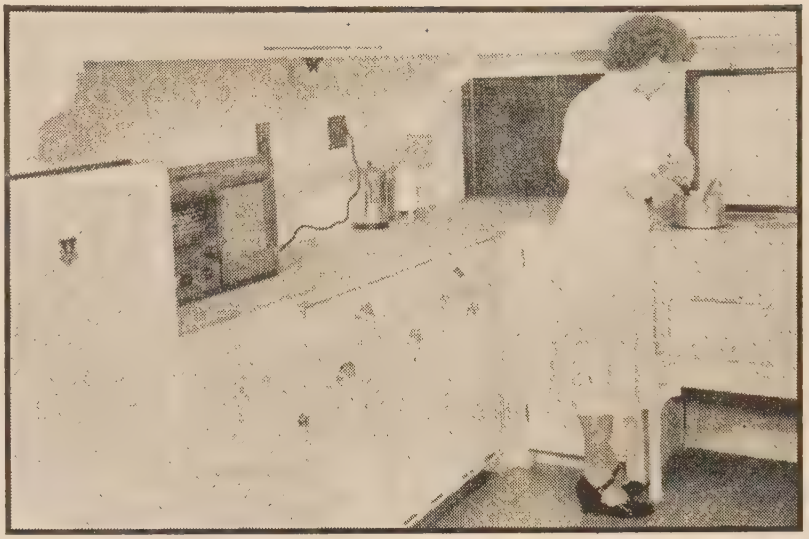
A plain, straight, blouse cuff is made by cutting on the straight grain a piece of material double the finished width plus seam allowances and the length of the wrist measurement plus ease, overlap for closing, and seam allowances. The amount of overlap depends on the style of the placket and the method of fastening. The cuffs are folded in halves lengthwise, right sides together, joined across the ends, and turned to the right side before being attached to the sleeve. If all stitching is to be invisible, the cuff is machined to the sleeve, which is gathered or pleated to fit, right sides together. The remaining raw edge of the cuff is turned in and hand stitched to the sleeve, each stitch being taken under a stitch of the machined row and into the seam allowances, so that the end of the sleeve is fixed between the two layers of the cuff. If decorative stitching is to be used on the outside of the garment, the cuff is attached to the wrong side of the sleeve first, the second edge of the cuff being turned in and stitched in position on the right side to hide the first row of machine stitching. If the sleeve has been gathered heavily, the join will be flatter if some of the fullness is trimmed out of the seam allowance as shown in the illustration above.

Cutting Fabric on the Bias

Material to be cut on the bias should either have a selvedge (woven edge) or be cut along a drawn thread exactly on the straight lengthwise grain. Fold the material so that this straight lengthwise edge lies parallel to the crosswise grain or weft. The selvedge will form a right angle when the fabric is correctly folded. The diagonal fold is the true bias, and strips for facing or binding may be cut parallel to this fold as illustrated on the left. If joining is necessary, place the strips together so that the seam comes on the straight grain; the strips are in the correct position to be joined when they are at right angles.

Saving Electricity in the Home

AS the greatest consumption of electricity in New Zealand occurs in the household, the largest saving of electrical power can be made by domestic users. In this article Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, discusses economies which can be effected by the housewife and how consumption can be regulated by reading the electric meter every few days.



[*National Publicity Studios photo.*

IT has been truly said that all domestic progress will take an electrically lit path. Electricity came first as a new source of lighting in the home, superseding oil, gas, and candles. In efficiency and in the saving of labour its use marked a great advance. But there is a world of difference between a house that is lit by electricity and the home that is run by electricity. Its full use affects even the foundation design of the house. A comparison between a modern house built to be run by electricity and any of the 19th or early 20th century houses that are in use today shows that electricity is not just a fuel capable of providing light and warmth without the dirt and drudgery associated with oil lamps and the making and clearing away of solid fuel fires, but is also a force, a form of energy that can be used to replace human energy in a multitude of household tasks.

Where electric energy is used with intelligence in the home, comfort and efficiency are achieved with the minimum expenditure of human energy, and the housewife has more time to devote to the art of homemaking in its subtler and less tangible aspects and to play a part in the welfare of the community in which she lives.

However, this electrically lit path of domestic progress does not seem to be a smooth one. To homes that are geared to the electrical standard of living there come for various reasons periods of restricted supply, necessitating the reduced use of some form of apparatus and a reorganisation at some inconvenience of the carefully planned work routines of the home specially devised by country women to fit in with the work of the farm. The crises in electrical supply in New Zealand are due to a natural cause—insufficient rainfall to fill the lakes the water of which is harnessed to provide the electrical energy. This affects the North and South Islands at different times. However, work is proceeding to increase the number and size of the hydro-electric generating plants so that ultimately the supply will meet all possible needs.

[*National Publicity Studios photo.*

Lifting heavy iron pots and kettles and lighting and tending an open fire made hard physical labour of daily household chores for pioneer women. A modern housewife who has the benefits of electricity turns a switch to obtain hot water or ice cubes, to cook a meal, or to clean the house, and she may listen to the radio for entertainment as she works. The electrically powered kitchen in the illustration at the top of this page contrasts sharply with this pioneer kitchen.

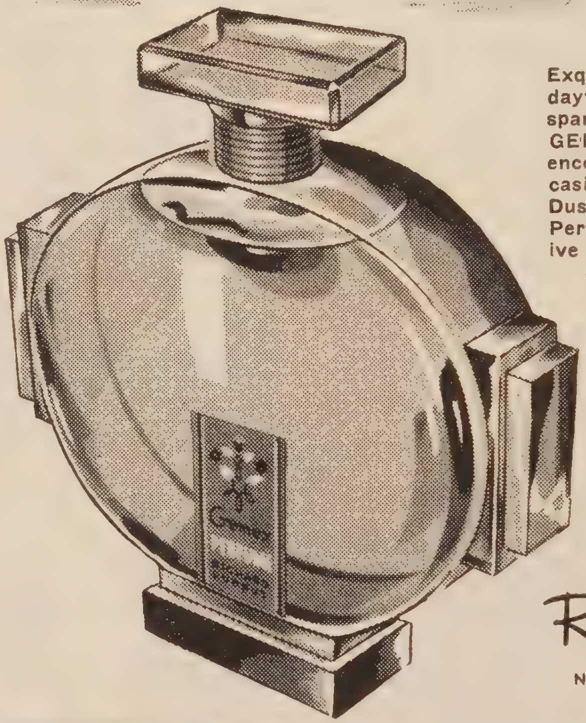
The graph on page 183 shows that the household is the greatest consumer of electricity. Over the 5 years shown well over half of the electricity used was taken by the consumer in the home. Of total electricity used in 1942 little less than 52 per cent. was taken by the domestic consumer, but by 1949 this proportion had risen to just more than 57 per cent. Therefore it is the domestic users who need to contribute the most to the saving of electrical power. The graph clearly indicates that of the total used in the home a little less than half was used by water heaters, which must be the greatest single use in which economies can be made.

Right Use of Electrical Power

The housewife has to be prepared for periods of power economy, some more stringent than others, which modify the enjoyment of the full electrical standard of life. Therefore, it would be an advantage to look more closely at the purposes for which electricity is used in the home. In England this need has been felt to be of sufficient importance to warrant the formation and action of an Electrical

Gemey

PERFUME



Exquisitely refreshing for daytime wear . . . so gay and sparkling for evening . GEMEY . . . a scented sequence of toiletries for all occasions . . . Talcum, Cologne. Dusting Powder, and Gemey Perfume itself, in an attractive new glass-stoppered phial.
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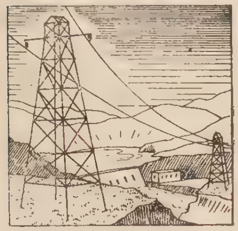
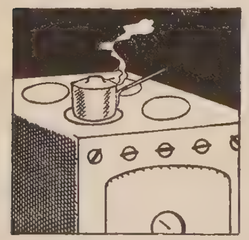
Association for Women. The Director, Dame Caroline Haslett, D.B.E., considers that her work is, and has been for about 25 years, the education of the public in the right use of electricity in the home, and her various published works have been used as references by the writer of this article. In America investigation has been proceeding along similar lines, and a number of conclusions have been reached which will also be of interest to rural consumers in New Zealand.



It is necessary to differentiate clearly between the use of electric current to fulfil the normal function of a fuel, when it is used as an alternative to gas, oil, or solid fuel, and its use as a force to operate motor-driven appliances, when it is used as an alternative to human energy.

This differentiation is of great significance for householders, as the current consumption of electrical motor-driven apparatus in the home is relatively small. This means that in times of shortages the housewife can still have electricity as a domestic servant if she studies how and at what rate electrical current is consumed in space heaters (radiators), cookers, vacuum cleaners, refrigerators, cake mixers, water heaters, sewing machines, irons, washing machines, etc. She may find that if she plans alternative means of heating rooms and water by solid fuel, and studies her cooking techniques to make full and economical use of the heat of the electric stove when in use, she can still have electrical energy to do her washing and ironing, to protect perishable food, to clean the house, to make clothes, and to mix the cakes. It may interest housewives to know that domestic water heaters consume more than one quarter of the electricity used for all industrial, commercial, and domestic purposes (see the accompanying graph). There may have to be reduced use of these amenities according to the degree of shortage.

In England the rationing of electricity is general and families find themselves without light or heat for several hours, days, or weeks, according to the skill they use to control consumption of power over the rationing period. The situation there puts a premium on the ability to read a meter and to know what a unit of electricity is and what it can do through the various domestic appliances. In New Zealand in the present shortages there is an increasing tendency among power boards to adopt rationing too; about half now use the quota system.



SERVICES GIVEN BY 1 UNIT OF ELECTRICITY

Appliance	Loading in watts	Time to consume one unit (hours)
Electric clock ..	1½	666⅔ (more than 27 days)
Lamp	25	40
Lamp	40	25
Lamp	60	16⅔
Lamp	100	10
Mixer beaters ..	25 to 120	40 to 8⅓
Sewing machines ..	40 to 50	25 to 20
Fans	40 to 100	25 to 10
Vacuum cleaners ..	130 to 400	8 to 2½
Immersion heaters .	250 to 500	4 to 2
Coffee percolators .	250 to 400	4 to 2½
Toaster	600	1⅔
Waffle irons ..	500 to 600	2 to 1⅔
Iron	600	1⅔
Kettles	500 to 2000	2 to ½
Refrigerators (large motor)	250 to 300	4 to 3⅓
Water heater ..	600	1⅔
Water heater ..	750	1⅓
Water heater ..	1000	1
Water heater ..	2000	½
Washing machines .	200 to 400	5 to 2½
Boiling plates on stove	1000 to 2000	1 to ½
Oven element ..	1500	⅔
Radiators	1000 to 3000	1 to ⅓
Tubular space heater	60 watts per foot of tube	According to length of tube

The Unit of Electricity

The unit is naturally a specified quantity of electricity, like the pound in weight, yard in length, or pint in measuring volume.

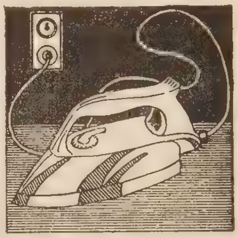
One unit of electricity has been consumed when a piece of apparatus marked 1000 watts has been connected to the main for 1 hour.

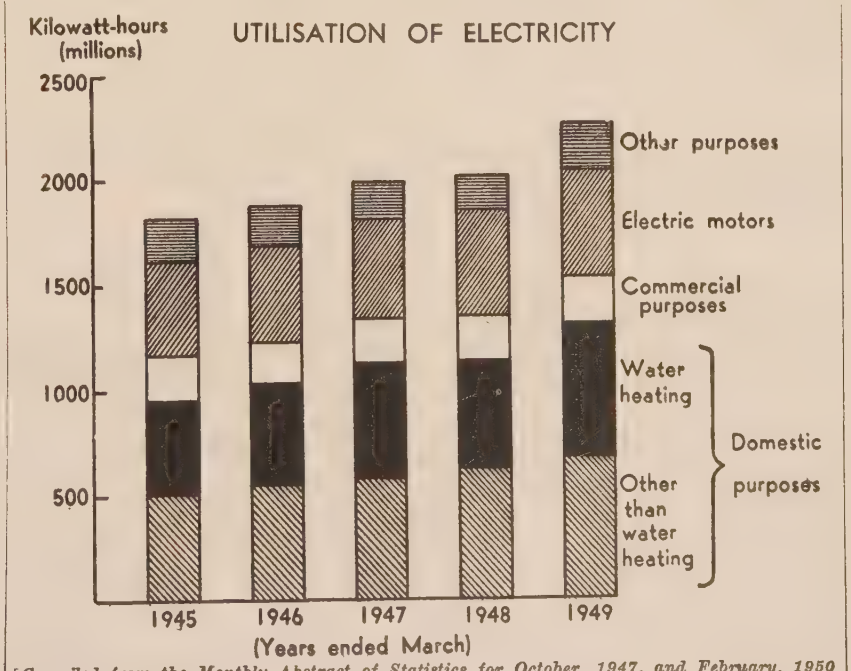
The unit is most often referred to as the kilowatt-hour, shortened to kWH. A pound of peas when shelled gives a variable quantity of edible peas, but a unit of electricity is always of the same value and bears a fixed relation to the loading in watts of an appliance. More electrical energy will be used by an appliance of 1000 watts than one of 100 watts for the same period, exactly ten times as much. Conversely, the same amount of electrical energy will keep a 100-watt appliance going ten times as long as it will a 1000-watt appliance.

This point is worth illustrating more fully, for it is the key to the solution of the housewife's problem in controlling her consumption of electricity. Every piece of electrical apparatus she buys should have the wattage or loading marked on it and she should know what that loading is. With the definition of a unit of electricity she can calculate her consumption. The table in the previous column sets out the wattage of different household appliances and the time for which they can be run by 1 unit of electricity.

Dame Haslett notes:—

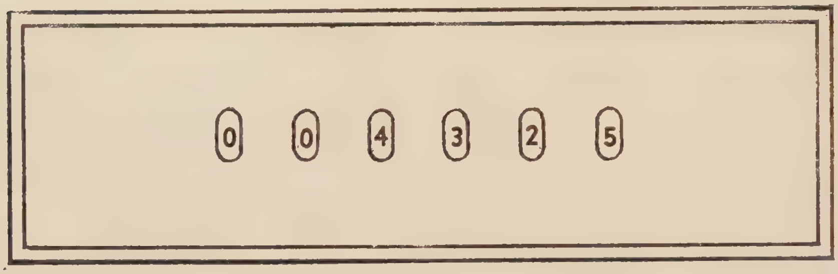
> It is an interesting fact that when the question of economising in the use of electric current is mentioned the first reaction of most people is to switch off the electric light, or to reduce the power of the lights in the house by substituting lamps of a lower wattage. The proportion of the domestic load which is accounted for by lighting is relatively small. If 100-watt electric lights were left burning in every room of a 10-roomed house they could consume in 1 hour only the same amount of current as a 1-bar electric fire would use in the same period. Bearing this principle in mind, it is necessary to consider what are the real needs of the household with regard to



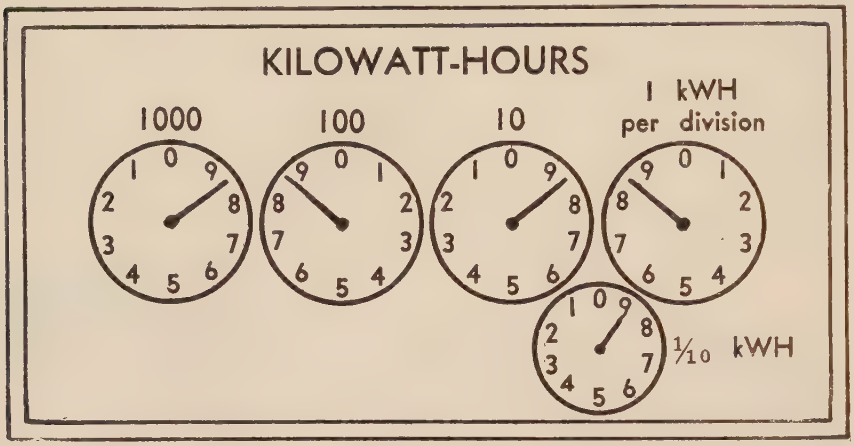


[Compiled from the Monthly Abstract of Statistics for October, 1947, and February, 1950

SAVING ELECTRICITY IN THE HOME



The two types of electric meters. Above—Direct-reading type. Below—Dial meter.



lighting from the point of view of safety, efficiency, and comfort. Industry has in the past few years paid special attention to the relation of efficient lighting in factories to health and production and the same principles may well be considered with regard to domestic lighting. A wartime social survey [in England] revealed how poorly lighted is the average home for even the most simple household task. Only one-third of the housewives thought that they could see well by artificial light. Over half the people had less than half the light they should have had in their kitchen, living room, or sitting room for sewing or reading.

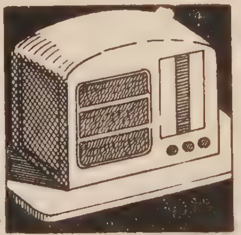
This is bad economy, both from their own and the national point of view, for there is no doubt that the morale and ability of people to work is a reflection of their home life and the comforts available in their home. There is no reason today why in the home, in schools, or at work eyes should be strained for lack of light.

In times of power shortages the chief aim should be the maintenance of adequate standards of lighting. The use of power can certainly be drastically curtailed for advertisement and decoration.

Where a small electric motor used to drive an appliance is rated in horsepower the wattage can be found by simple conversion. A 1-h.p. motor is equivalent to an appliance with a loading of 746 watts. A sewing machine uses a motor of 1/20 h.p., which is equivalent to a loading of less than 40 watts. It can therefore be run for more than 25 hours to use 1 unit of electricity. Few housewives run their sewing machines more than 25 hours in a month, so the consumption of electricity to do the family sewing is negligible.

Meter Reading

Meters, of which there are two types, are marked in kilowatt-hours. The first type gives direct readings like the mileage indicator of a motor-car and the second type gives dial meter readings (see the illustration above). On the dial meter there are usually four dials to record units, tens, hundreds, and thousands of kilowatt-hours. In addition, there are either one or two smaller dials which register 1/10 kilowatt-hour and 1/100 kilowatt-hour per division on the dial respectively. The pointers revolve alternately in a clockwise and an anti-clockwise direction.



To take the reading begin at the dial at the extreme left, which registers thousands of kilowatt-hours. Take down the last figure at which the pointer has rested and read each dial in turn. The meter reading shown in the illustration above is 8888.9 units, made up as follows:—

					Units
Dial on left	8	×	1000	=	8000
Second dial	8	×	100	=	800
Third dial	8	×	10	=	80
Fourth dial	8	×	1	=	8
Fifth dial	9	×	0.1	=	0.9
Total					8888.9

Note: The pointers of the large dials are not on figure 8, but nearly on figure 9. In the small dial the pointer is on figure 9.

Practical Application

All the factors affecting the consumer in times of unavoidable shortages can be condensed in a few rules for practical application by the individual housewife. Where quota rationing is the means adopted for saving, the most effective economy is obtained by limiting the use of radiators and water-heating appliances. Not only is their loading high, leading to a high consumption of electricity per hour, but in practice they are in use for long periods of time compared with irons, sewing machines, etc. Therefore the use of fires should be started earlier in the year for space heating and the electric radiator put away. Moreover, the electric heating of water should be cut off entirely if there is an alternative method available, or it should be limited to reduced periods for essential purposes and the water used at a lower temperature.

This is surely not too heavy a price to pay to keep the country's essential work in running order. It is a less costly price than cutting down all industry to a 4-day week as was attempted in one country. That method leads to many troubles. The housewife should become accustomed to reading the meter every few days, tightening or releasing the restrictions as the meter indicates a consumption above or below the quota to be rationed.

Those without electric water heating need to save electric power in other ways. The electric oven is an efficient piece of equipment, and much can be accomplished for the expenditure of 1 unit of electricity per person per day, which is the quantity the average electric oven consumes.

These suggestions should enable all consumers to make their reductions in the way best suited to their requirements and habits of life. That is their right.

◆

Reversible Pullovers

As small boys, and some men too, seem to have difficulty in telling right from wrong sides of knitted pullovers, it is worth while when knitting for them to choose patterns which turn out the same on both sides or in which there is no obvious right or wrong side. Then, if a little extra care is taken in finishing off and sewing up, the garment may be worn either side out, its life is lengthened by distributing wear more evenly, and there are no more cries of "Which way does this go?" This recommendation is especially suitable for sleeveless pullovers.

When knitting, splice the wool, as knots would make the joins conspicuous. To join the seams, instead of holding the sections side by side and sewing over and over, have them flat, edge to edge, and join with a darning-type stitch, backward and forward. Shoulders may also be joined this way or by grafting. For the bands round neck or armhole pick up the stitches alternatively plain and purl and from the front and back of the edge, as this prevents the formation of a ridge on one side, and cast off plain and purl.

—NORMA K. METSON,
Rural Sociologist, Department
of Agriculture, Wellington.

◆

THE MUSEUMS OF NEW ZEALAND

THE nine previous articles in this series by Enid B. V. Phillips have described different museums from Whangarei to Invercargill which range in size from the impressive metropolitan museum to the small-town museum of parochial interest. In this article she deals with the museum of the place with the greatest historical significance in New Zealand—Waitangi.

The Waitangi Museum

WHEN the chiefs at Kerikeri petitioned William IV, praying that he should extend his protection to these islands, the King responded by appointing James Busby, an Australian colonist then visiting England and a man whose pen revealed him to be thoroughly au fait with Antipodean affairs, as British Resident in the Bay of Islands. (Busby, who had been thoroughly educated in the classics during his student days in Edinburgh and who was equally well versed in botany and geology, had supplemented his course of studies by travelling through France and Spain to acquaint himself with the most up-to-date methods of viticulture. The result was not only a most pleasingly written technical "Treatise on the Vine", a Sydney publication dated 1825, but three collections of vines totalling more than 1200 plants and including specimens from the Montpelier Botanic Gardens and the national garden at Luxembourg, which completely filled two cabins aboard the Matilda, the vessel that transported them to Australia.)

Busby's house requirements in New Zealand were extremely modest, considering that the proposed residence had to be of a style sufficiently impressive to uphold the prestige of the Crown and at the same time conform to the needs of a young man contemplating matrimony. Nevertheless, though the plans prepared by the Sydney architect J. Verge estimated the entire cost at a mere £592 15s. 4d. for "a house in a frame", the technical term was misconstrued to mean "the frame of a house", and there was much altercation before the plans, considerably modified by a Mr. Hallen (presumably the Colonial Architect), were eventually approved.

Help from Missionaries

In the meantime Busby, who had arrived in New Zealand in May, 1833, was pleased to avail himself of the hospitality of the missionaries, who, being as proficient in practical matters as they were in theology, gave him much help with the building of his house. The timber sections arrived from Australia for two rooms and a vestibule, all that the authorities would allow him. Commenting on this, the Waitangi historian T. Lindsay Buick says: "At no stage in his career was Mr. Busby embarrassed by official generosity!" The framing was of jarrah, the hall flooring of Australian ironbark, the windows and doors of cedar, and the weather boards of jarrah and cedar. The foundations of the house were of boulders, and Sydney sandstone was used for the fireplace hearths and the flagstones paving the wide veranda.

Busby was soon comfortably settled in his new abode and it is recorded that on March 20 the next year, after taking part in the presentation of a national flag to the principal northern chiefs, he invited the officers of H.M.S. Alligator to the Residency, where they were regaled with "a cold collation". (Incidentally, Busby had received high praise from Australian quarters the previous month. The Chief Justice and the Colonial Secretary, having completed their examination of the vines in the New South Wales Botanic Garden which Busby had collected in France, advised His Excellency Major-General Richard Bourke that "the inhabitants of Australia are under great obligations to Mr. Busby for having transferred to these shores a national collection of vines such as was acquired in France after the Napoleonic Wars by the Minister of the Interior, having at his command the means and resources of the French Empire".) Apparently naval nomenclature of the period favoured the more deadly species of reptiles as being symbolic of their death-dealing propensities in battle, for the vessel which brought Captain William Hobson, R.N., to these shores 3 years later was called H.M.S. Rattlesnake.

Hobson's Delicate Mission

As a result of his report to the Marquis of Normanby, the Colonial Secretary, Hobson was sent out again to New Zealand, this time as British Consul, and entrusted with the delicate mission of persuading the Maoris to cede the sovereignty of the country to the British Queen. At Waitangi (Weeping Waters) on February 5, 1840, he met the chiefs in a large marquee made from a framework of spars covered with sailcloth which had been erected on the sloping lawn of the Residency. Here, with the invaluable help of the Rev. Henry Williams, head of the Anglican Mission, as interpreter, he discussed the terms of the Treaty, being greatly aided in his negotiations by Busby.

[National Publicity Studios photo.

The Treaty House, Waitangi, the residence of James Busby. The anchor under the giant pohutakawa came from the brig Pioneer.

Next day, the signing of the Maori Magna Carta, as the venerable Arawa leader Mita Taupopoki termed it, took place, many of the chiefs attaching their moko (face tattoo mark) to the document in lieu of signature. And as the Union Jack was unfurled from the flagstaff at Waitangi and a salute of 21 guns sounded from the frigate which brought him to the Bay of Islands from Sydney Hobson summed up the true significance of the event in the historic phrase: "He iwi tahi tatou—we are now one people."

In accordance with Lord Normanby's instructions Captain Hobson was now entitled to become Lieutenant-Governor of the colony, thus superseding Busby. However, this did not necessitate the former Resident's leaving his home; as his family responsibilities increased the Residency had to be correspondingly enlarged and so a wing built of New Zealand timbers was added to the south side of the original building and another to the northwest.

Busby had also purchased additional land from the Maoris and he continued to look after his estate with the utmost efficiency. The slopes of Waitangi are reputed to have been "festooned in vines" which produced grapes par excellence. He died while on a visit to England in 1871 and was buried in London. (Mrs. Busby's grave and those of two of her children are in the old churchyard at Paihia.)

Ultimately the whole property passed into the hands of strangers, and its prosperity gradually diminished with the passing of the years until 1932, when the Governor-General, Viscount Bledisloe, and his wife, who were touring the Bay of Islands at the time, decided to acquire the Treaty House and surrounding lands to the extent of about 1000 acres and present them to the people of New Zealand.

Restoration of Residence

Under the direction of the Waitangi National Trust Board's honorary architects, W. H. Gummer, of Auckland, and W. M. Page, of Wellington, the work of restoring this gem of Georgian architecture, with its simple white-columned veranda and moss-grown grey roof of kauri

Only one soap gives your skin this exciting bouquet

Cashmere Bouquet

THE ARISTOCRAT OF FINE TOILET SOAPS

shingles in the colonial style, was faithfully carried out even to the furnishings. The grounds were likewise laid out in harmony with the period.

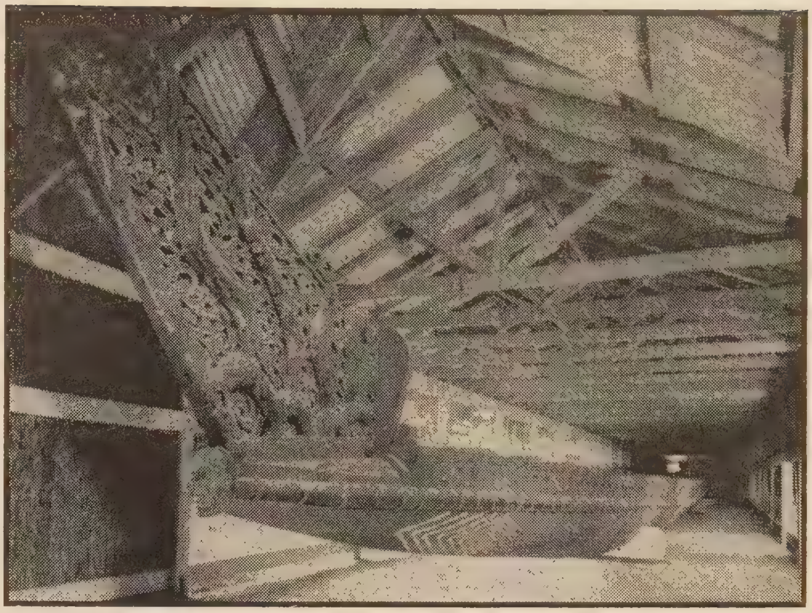
At the express wish of Their Excellencies a museum was established in the southern wing, which was reconditioned and made fireproof for this purpose, and there was intense excitement when Busby's diary was discovered in the attic by some workmen. A memorial tablet to Busby in the museum is inscribed: "He built this house and lived in it. Under difficult conditions he served both Pakeha and Maori with courage, impartiality and fidelity."

The brass tablet in the hall commemorates the Maori chiefs who signed the Treaty. The Trust Board much appreciated the advice and help of Dr. Gilbert Archey, Director of the Auckland War Memorial Museum, Johannes C. Andersen, late Librarian of the Alexander Turnbull Library, Wellington, and Vernon H. Reed, Honorary Secretary and Administrator, in setting up this museum.

The front of the museum faces the 112ft.-high flagstaff, erected by the Royal New Zealand Navy. At the top of the masthead is the treasured crown from the ensign staff of New Zealand's first warship, H.M.N.Z.S. Philomel, and at the foot is a commemoration stone which reads:—

> On this spot on the sixth day
> of February 1840 was signed
> the Treaty of Waitangi
> under which New Zealand became
> part of the British Empire

Pieces of the original flagstaff of Baltic pine, which was cut down time and again by Hone Heke, have been fashioned into an inkstand which is displayed in the museum.

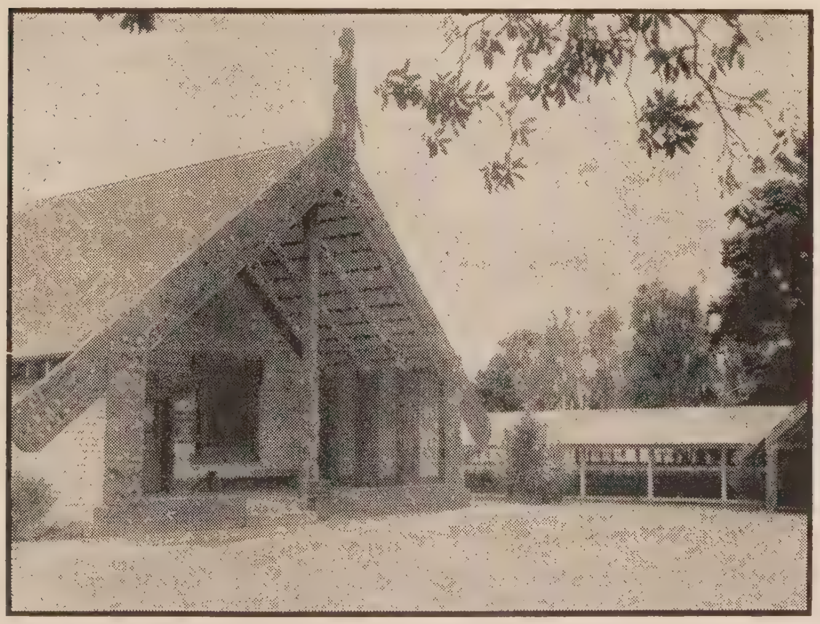


[*National Publicity Studios photo.*

The war canoe presented by the Tokerau tribes. It is 117ft. long and holds 140 people.

Colourful Setting

From the museum windows you look out upon the blue waters of the bay, dotted with tiny islands and encircled by green hills over which hover snowy drifts of cumulus clouds, and across to the township of Kororareka (Russell) in the distance. Hydrangeas thrust their rosy florets close to the white-walled house, and hibiscus blaze with a myriad coral flames against the sombre background of the native bush. The Norfolk Island pines which Busby grew from seed sent him by his brother, a surgeon stationed at the island's convict settlement, are tall trees now and the oaks and other English trees are picturesquely gnarled with age.

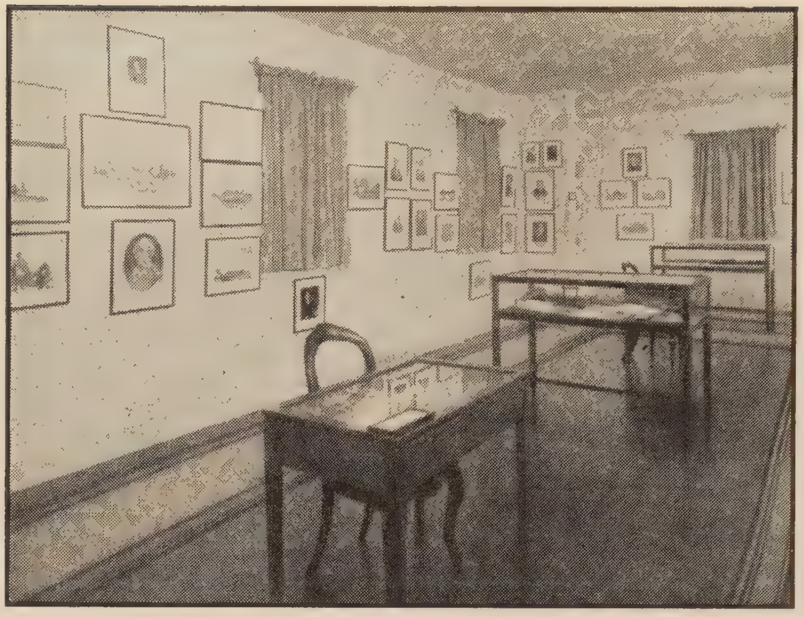


[*National Publicity Studios photo.*

The whare-runanga, carved house, with the war canoe house in the background.

There are numerous stories concerning the giant pohutukawa on the lawn. It shelters a large anchor which was lost in the Kawakawa River by the brig Pioneer in 1809, when the trader slipped anchor after word was received of the Boyd massacre, and sought safer waters. The cannon balls by the veranda came from Ruapekapeka Pa, Kawiti's stronghold, which was the scene of the final battle between the British forces and the opposing Maoris in the Northern war, terminating on January 10, 1846.

A dais was erected under an enormous elm for Lord and Lady Bledisloe when His Excellency laid the foundation stone of the whare-runanga, the carved house, presented by the Ngapuhi tribe. This national Maori centennial memorial has been built near the Treaty House of the pakeha, thereby symbolising the friendly relations of the two races. The opening ceremony was held on February 6, 1940, on the 100th anniversary of the signing of the Treaty of Waitangi. The tuhu tuhu or kowhaiwhai (coloured scroll work) and the tukutuku (decorative reed panels) are admirable examples of Maori art, and the carvings, every piece of which has its particular meaning, are representative of all the tribes throughout New Zealand. The 117ft.-long waka taua, the war canoe used in the centennial celebrations, was made from kauri trees



[*National Publicity Studios photo.*

The muniment room in the Treaty House at Waitangi.

from Puketi Bush and presented by the Tokerau tribes. It is now housed alongside the whare-runanga, and its 80 paddles, the blades pointing upward, are placed in groups of four between the uprights of the railing enclosing the shelter. The canoe holds 140 people.

Gifts from Maori Tribes

The puriri fence marking the boundary of the Waitangi estate for 4 miles was the gift of the Ngapuhi. The South Island Maoris sent a "coronation" chair carved from totara and having a woven reed back and a crimson leather seat, the chair resting on a block of tangiwai greenstone, and the Taranaki tribes contributed a painting of the signing of the Treaty—"This Treaty has been rained upon by the rain, it has been exposed to the blast of the storm, but the words are still clear, they cannot be obliterated". Other valuable pictures were received from the Royal Society of Tasmania, Lady Pomare, and C. F. Goldie, the last named presenting his newly painted portrait of Tamata Waaka Nene, one of the principal supporters of the Treaty.

In accordance with the museum's policy of building up a pictorial record of New Zealand history up to 1842 the walls are panelled with portraits of persons who influenced the course of events leading to the founding of the colony and its cession to the Crown. Pictures of historic scenes are grouped in sequence and intermingle with those of the Empire builders. In most cases the elaborate gowns and coiffures of the womenfolk are the epitome of elegance. Miss Agnes Busby, of Gisborne, one of the surviving granddaughters of the ex-Resident, recently presented the museum with copies of miniatures of her grandparents painted in Sydney in the 30's of last century.

Showcases contain relics of the early days along with many documents and letters, including Captain Hobson's affectionately phrased letters to his wife. These have a particular poignancy in view of the fact that he was seriously ailing at the time, and his death occurred only 2 years after the signing of the Treaty. One epistle dated March 24, 1840, comments: "Thank God I am progressing just as fast as I could expect. I slept well last night and awoke ready for my breakfast. The weather is very fine and that serves me in two ways, first in thinking of you who may be at sea and second in being enabled to take exercise in the open air." Another memento of the gallant captain is a beautiful green and gold plate belonging to his Spode dinner set.

Feminine Foible

There is a picture of Mrs. Hobson and her children among the portraits in the museum, likewise one of Mrs. Henry Williams, wife of the founder of the Paihia Mission station. Their first house is also pictured. Mrs. Williams is said to have dressed her children in the most modish manner possible to prevent them from becoming "perfect little savages"—a very feminine foible, yet surely more than counterbalanced by her characteristic unhesitancy in bundling all her family into a boat and, with only a young Maori girl to help her row, going to Mrs. Busby's assistance when the need arose.

Marianne Williams was also a superb cook, and the mountains of pies and plum puddings, the savoury boiled pork and potatoes, and the jams, jellies, and crisp-baked bread which she turned out in her tiny portable kitchen were miracles of culinary perfection and must have had an appreciable effect on the morale of the little missionary community, whose menfolk often walked many miles a day in the course of their duties. Visitors, whether Maori or pakeha, were always made welcome and only a few weeks before the birth of her fourth baby she recorded in her journal the entertaining of the Rev. S. Marsden, the Rev. King, and the celebrated chief Hongi, who arrived unexpectedly at teatime one evening. Beds were made up in the sitting-room for the three guests, four Maori members of the ship's crew were accommodated in the adjacent room belonging to the other missionary family who shared the four-roomed hut with the Williamses, and five native girls slept in the entrance porch—"all these, in addition to the Fairburns, ourselves, and the children, in a rush dwelling 40ft. long x 15ft. broad. My company ate up my batch of bread, which happily held out; and the ship's crew had enough also. . . ."

Among the Waitangi relics connected with Royalty are the musket and sword bayonet bestowed on the chief Waikato by William IV during Waikato's visit to England with Hongi Hika in 1820 and a Coronation plate and an embroidered handkerchief which belonged to Queen Victoria, the touches of black in the very fine needlework being indicative of mourning. There is also a portrait of the Queen painted at the time of the Treaty.

Popular Lectures

The former curator, Miss Katherine V. Lloyd (an ex-schoolteacher and daughter of a historian), spent much of her time conducting visitors over the Treaty House, her explanatory lectures being a most popular feature of the tour. Within 6 years the number of visitors to Waitangi has increased from 6000 to 35,000 a year and it has now been found more practicable to present each one with a printed guide giving a brief history of Waitangi and listing in chronological order the pictures and portraits in the muniment room (a collection that has been considerably augmented of late and re-arranged accordingly), together with a short note concerning each exhibit. This interesting little booklet, which also explains the significance of the carvings and other ornamental work in the whare-runanga, has been compiled by the Honorary Administrator of the Waitangi National Trust, Vernon H. Reed.

Parties of scholars from schools between Kaitaia and Taranaki have been in residence at Waitangi, the Education Department considering these visits of such benefit that they are permitted in term time and financial assistance is granted for travelling expenses; accommodation at Waitangi is free. Each visit lasts a week and arrangements are made for the conveyance of the school party by bus or launch to outlying places of historical interest. It is hoped that when the facilities for accommodation and board can be extended schools from more distant parts of New Zealand will be able to make the pilgrimage to this important national museum.

LUNCHES to be PACKED and CARRIED

By

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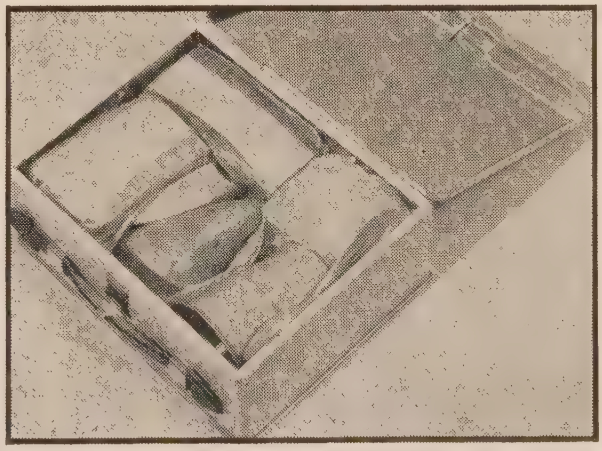
THE making of varied and interesting lunches which also have a high nutritive value seems to present a perennial problem if the number of children whose luncheon invariably consists of pies, fish and chips, or perhaps a cafeteria meal of tea, sandwiches, and cakes is any criterion. Many adults, forced to eat away from home at lunch time, prefer any sort of cafeteria meal rather than a carried lunch consisting always of slightly squashed sandwiches, varying only in their degree of staleness. Any attempt to provide variety in fillings is often spoiled by the admixture of flavours alien to each other, as occurs in the enforced intimacy of paper bags—oranges, cheese, chocolate cake, onion, vanilla biscuits, or other irreconcilable flavours cohabiting for several hours in a tightly closed lunch box, and perhaps aggravated by the lingering flavours of the previous day's lunch. On the other hand, the housewife faced with the daily task of planning and preparing lunches while cooking the family's breakfast and getting everyone ready for work or school cannot be blamed for becoming impatient with their demands and complaints. Consequently, to avoid monotony for both eater and packer lunches must be planned beforehand and as much of them as possible prepared during the previous day.

AMONG points to be considered are the nutritive value of the lunch—it is one of the three main meals of the day and therefore should be as nutritious as breakfast or dinner—and the type of lunch preferred; lunches are frequently eaten in crowded school lunch rooms, or alone, or in unattractive surroundings, so it is important to whet the appetite by packing attractively a lunch its owner really likes.

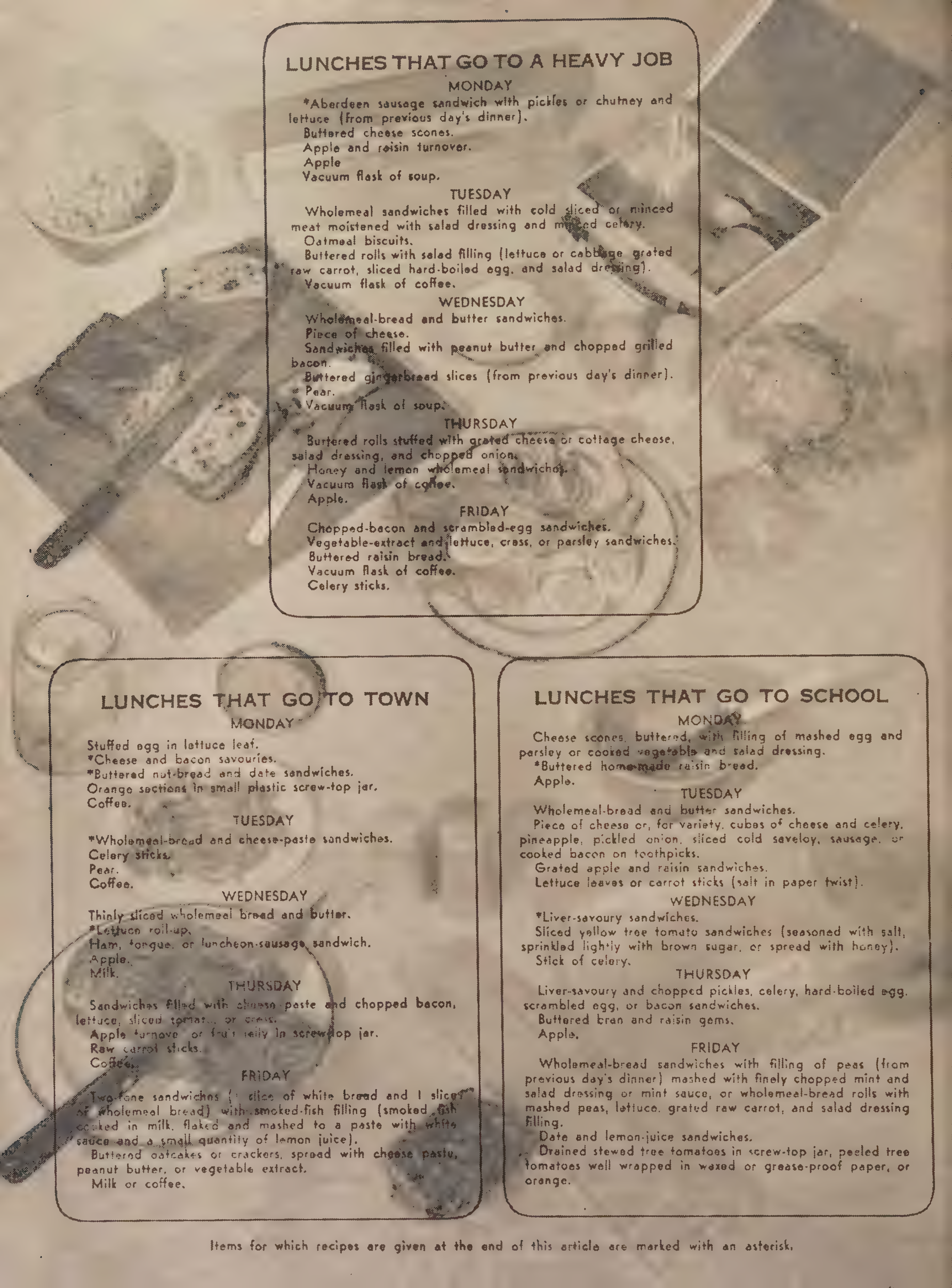
Ensuring Nutritive Value

A lunch should be substantial enough to provide about a third of the daily need for energy and other nutrients. It should contain not fewer than three substantial sandwiches or their equivalent, and two sandwiches should have generous fillings of rich protein foods, such as egg, cheese, fish, liver, cottage cheese, meat, peas, beans, or peanut butter. At least two-thirds of the sandwiches should be made with wholemeal or wheat germ bread, though "two-tone sandwiches" (one slice of wholemeal and one slice of white bread together) add variety and may persuade otherwise reluctant lunch carriers to eat wholemeal bread. This improves the vitamin B content of the lunch—particularly the vitamin B_1 content—and fillings of egg, cheese, or liver provide valuable amounts of vitamin A, others of the B group of vitamins, and iron or calcium.



A well-packed lunch tin. Differently flavoured foods are wrapped separately and the meal looks attractive.

[Upper photograph by Sparrow Industrial Pictures Ltd.



LUNCHES THAT GO TO A HEAVY JOB

MONDAY

*Aberdeen sausage sandwich with pickles or chutney and lettuce (from previous day's dinner).

Buttered cheese scones.

Apple and raisin turnover.

Apple

Vacuum flask of soup.

TUESDAY

Wholemeal sandwiches filled with cold sliced or minced meat moistened with salad dressing and minced celery.

Oatmeal biscuits.

Buttered rolls with salad filling (lettuce or cabbage grated raw carrot, sliced hard-boiled egg, and salad dressing).

Vacuum flask of coffee.

WEDNESDAY

Wholemeal-bread and butter sandwiches.

Piece of cheese.

Sandwiches filled with peanut butter and chopped grilled bacon.

Buttered gingerbread slices (from previous day's dinner).

Pear.

Vacuum flask of soup.

THURSDAY

Buttered rolls stuffed with grated cheese or cottage cheese, salad dressing, and chopped onion.

Honey and lemon wholemeal sandwiches.

Vacuum flask of coffee.

Apple.

FRIDAY

Chopped-bacon and scrambled-egg sandwiches.

Vegetable-extract and lettuce, cress, or parsley sandwiches.

Buttered raisin bread.

Vacuum flask of coffee.

Celery sticks.

LUNCHES THAT GO TO TOWN

MONDAY

Stuffed egg in lettuce leaf.

*Cheese and bacon savouries.

*Buttered nut-bread and date sandwiches.

Orange sections in small plastic screw-top jar.

Coffee.

TUESDAY

*Wholemeal-bread and cheese-paste sandwiches.

Celery sticks.

Pear.

Coffee.

WEDNESDAY

Thinly sliced wholemeal bread and butter.

*Lettuce roll-up.

Ham, tongue, or luncheon-sausage sandwich.

Apple.

Milk.

THURSDAY

Sandwiches filled with cheese-paste and chopped bacon, lettuce, sliced tomato, or cress.

Apple turnover or fruit jelly in screw-top jar.

Raw carrot sticks.

Coffee.

FRIDAY

Two-tone sandwiches (1 slice of white bread and 1 slice of wholemeal bread) with smoked-fish filling (smoked fish cooked in milk, flaked and mashed to a paste with white sauce and a small quantity of lemon juice).

Buttered oatcakes or crackers, spread with cheese paste, peanut butter, or vegetable extract.

Milk or coffee.

LUNCHES THAT GO TO SCHOOL

MONDAY

Cheese scones, buttered, with filling of mashed egg and parsley or cooked vegetable and salad dressing.

*Buttered home-made raisin bread.

Apple.

TUESDAY

Wholemeal-bread and butter sandwiches.

Piece of cheese or, for variety, cubes of cheese and celery, pineapple, pickled onion, sliced cold saveloy, sausage, or cooked bacon on toothpicks.

Grated apple and raisin sandwiches.

Lettuce leaves or carrot sticks (salt in paper twist).

WEDNESDAY

*Liver-savoury sandwiches.

Sliced yellow tree tomato sandwiches (seasoned with salt, sprinkled lightly with brown sugar, or spread with honey).

Stick of celery.

THURSDAY

Liver-savoury and chopped pickles, celery, hard-boiled egg, scrambled egg, or bacon sandwiches.

Buttered bran and raisin gems.

Apple.

FRIDAY

Wholemeal-bread sandwiches with filling of peas (from previous day's dinner) mashed with finely chopped mint and salad dressing or mint sauce, or wholemeal-bread rolls with mashed peas, lettuce, grated raw carrot, and salad dressing filling.

Date and lemon-juice sandwiches.

Drained stewed tree tomatoes in screw-top jar, peeled tree tomatoes well wrapped in waxed or grease-proof paper, or orange.

Items for which recipes are given at the end of this article are marked with an asterisk.

. . . LUNCHES TO BE PACKED AND CARRIED

Crisp raw fruits and vegetables not only carry well but are sources of vitamin C and other nutrients, and they help to clean the teeth at the end of the meal. Those which are good sources of vitamin C include oranges, tomatoes, sturmer apples, lettuce, swede or white turnips, radish, cress, and parsley; less valuable as sources of vitamin C are carrots, celery, other varieties of apples, and pears, but as they add variety and help to clean the teeth they are useful alternatives to the first group.

Adults need a pint of milk daily and school children 1¾ pints, but sometimes it is difficult to consume sufficient unless a milk drink is taken at lunch time. Children receive milk at school, so milk need not be included in their lunches, but adult lunch carriers should ensure that a milk drink is a regular feature.

Sweets, iced cakes, sweet pastries, and other foods high in energy value but deficient in minerals and vitamins should be avoided, as their excessive consumption is a predisposing factor in tooth decay, as well as tending to lower the consumption of minerals and vitamins below the level essential for good health.

Packing the Lunch Tin

Paper bags and cardboard boxes are not suitable for carried lunches. To put a paper bag of food in a suitcase or school bag with heavy books is to invite disaster; cardboard boxes cannot be washed and soon become stained and redolent of the flavours of past lunches. Lunch tins which can be painted attractive colours are easily washed, inexpensive, and light and convenient to carry.

Differently flavoured foods and sandwiches should be wrapped carefully and separately in waxed or greaseproof paper to prevent flavours mingling and help to keep food fresh. Newspaper should never be used.

Plastic bags and sheets of plastic specially treated for using with food are now available and represent a considerable saving because they can be used repeatedly, are simply washed, and are better than waxed or greaseproof paper for keeping sandwiches and other foods fresh.

For carrying stewed fruits, fruit jellies, custards, orange sections, vegetable aspics, or other soft foods which may be included as an occasional surprise, small, light, plastic, screw-top jars and plastic spoons are available. They are more durable and of a more useful size than glass ones.

Choice of Fillings

A good supply of sandwich fillings which keep well is a useful adjunct to the lunch packer's provisions. Stored in a separate cupboard and replenished when necessary, they ensure against the occasional appearance of a "scratch" lunch.

Sandwich fillings should be easily spread, sufficiently moist to prevent the sandwiches coming apart, and well seasoned. Fillings which stain the bread or soak into it and make it soggy should not be used unless they are special favourites of the lunch carrier. Peanut butter, pickles and relishes, mustard (for adults' lunches), nuts, cheese and home-made cheese spreads, small tins of fish, meat, peas, or beans, salad dressing, meat or vegetable extract, and dried fruits are fillings which keep reasonably well and ensure plenty of variety. In families where they are popular as sandwich fillings, jams — especially varieties which jelly firmly and do not soak through the bread—and honey are useful.

Preparation of Foods

Leaving the preparation of lunches until the last moment before the children leave for school or the family for work is unwise. Sufficient amounts for 2 or 3 days of such sandwich spreads as liver or cheese paste can be prepared at a convenient time, covered, and stored in a refrigerator or cool safe. That does not necessarily mean that the lunches will be monotonous: A cheese spread may be sprinkled with chopped celery one day, with lettuce the next, and grilled bacon or a whole tomato may be used as an accompaniment on the following day.

For people who like to prepare sandwiches on the previous evening plastic lunch bags are most useful, as they keep sandwiches fresh overnight. However, sweet and savoury sandwiches, fruits, and biscuits must all be wrapped separately to prevent the flavours from mingling.

Time is saved and lunches arrive at work or school with a fresher flavour if lunch boxes and vacuum flasks are unpacked immediately they arrive home, washed, and left open to the air until the lunch is ready to be packed.

For children who do not receive school milk, or for adults who cannot easily obtain a hot or cold drink at work, a vacuum flask in which to carry hot soup and hot drinks in winter and chilled milk or fruit drinks in summer is almost a necessity, as it ensures that beverages are kept in the best possible condition.

Planning the Menu

On the opposite page are some suggested lunch menus for school children, for outdoor workers, and for office workers, who, though they may not develop such hearty appetites, have just as great a need of an attractive, nutritious lunch.

Something they can eat quickly and easily is probably the first requirement of younger school children, who do not want to spend their precious playtime arranging things for themselves. Anything in sandwich form is therefore popular, especially with boys. They like something which can be traded or shared with a friend, and they do not like to be bothered with jars, spoons, or mugs which must be carried home. On the other hand, older children, and particularly secondary-school girls like an occasional little surprise packed in with the everyday sandwiches, and savoury eggs, fruit salad, aspic or fruit jellies, custards, stuffed baked apples or pears, and other gelatine desserts, which are easily carried in small screw-top jars, are popular.

The menus given are for sample winter lunches, with some alternative suggestions where ingredients may be unobtainable. Because bread is often stale and unpalatable on Mondays, lunches which make use of other foods are included. However, bread may be freshened quite easily by brushing the crust lightly with water, standing it on a rack in the oven over a baking dish of hot water, and baking it in a cool oven (250 degrees F.) for about half an hour.

Lunches that can be packed into a small space are preferred by office workers; a small flat tin which fits into a shopping basket or brief-case is often more popular than the ordinary lunch box or tin. They like interesting foods, satisfying but not too high in energy value, and sticky or sweet sandwich fillings are usually less popular than savoury fillings.

Where there are school children and office workers in the same family, lunch menus can, of course, be adapted to reduce preparation times.

Other Sandwich Fillings

Here are some sandwich fillings which can be used as alternatives to those in the suggested menus:—

For Summer Lunches

Tomato with cheese, tinned fish and lemon, hard-boiled egg and parsley, or cucumber.

Cucumber with lettuce and salad dressing or with cottage cheese.

Creamed sweet corn.

Asparagus.

Sliced radish with lettuce and salad dressing or with cottage cheese.

For Winter Lunches

Peanut butter with relish, chopped celery, currant jelly, raisins, or shredded carrots.

Tinned fish, mashed with lemon juice or vinegar, salt, and pepper to taste.

Cottage cheese with dates or other dried fruits, celery, onion, salad dressing, or grated raw carrot or chives.

Baked beans mashed, alone or with sliced sausages or meat loaf, tomato sauce, bacon, or lettuce and salad dressing.

Cheese and chopped chives.

Sweet sandwiches

Mashed banana, alone or with raspberry jam, a tart fruit jelly, lemon juice, raisins, figs, or prunes.

Chopped dried fruits and grated apple.

Mincemeat (equal quantities of minced dried fruits moistened with lemon juice and stewed apple, and flavoured to taste with ground mixed spices and ginger).

Breadless Sandwich

Cut two thick slices of cold meat loaf or Aberdeen sausage. Fill them with 2 tablespoons of left-over potato salad and lettuce leaves or pickle, and wrap the sandwich firmly in greaseproof paper.

Recipes

The recipes which follow are for items marked with an asterisk in the suggested menus.

Raisin or Nut Bread

4oz. of white flour
4oz. of wholemeal flour
1 egg
2 to 3oz. of golden syrup or honey
1oz. of melted butter
½ to ¾ cup of milk
½ teaspoon of salt
5 level teaspoons of baking powder
¾ cup of chopped raisins

Sift the dry ingredients together and gradually add the beaten egg mixed with the melted butter, golden syrup, and most of the milk. Mix them to a soft dough with the remainder of the milk. The mixture should drop from a raised spoon. Pour it into a greased tin and bake it at 375 degrees F. (a moderate oven) for 1 hour.

A third to half a cup of chopped nuts or dates may be substituted for raisins.

Aberdeen Sausage

1lb. of minced steak
½lb. of minced bacon
½lb. of minced liver
2 sheep's kidneys, minced
1 tablespoon of minced onion
2 beaten eggs
1 teaspoon of mixed herbs
1 tablespoon of chopped parsley
2 cups (8oz.) of soft breadcrumbs
¼ teaspoon of pepper

Combine the ingredients, shape the mixture into a roll, and tie it in a well-floured cloth. Plunge it into boiling water, boil it for 5 minutes, simmer it for 2½ to 3 hours, and press it until it until it is cold.

Liver-savoury Sandwich Filling

¼lb. of minced cooked liver
2 tablespoons of chopped or minced celery
1 tablespoon of minced onion
¼ teaspoon of salt
3 tablespoons of salad dressing

Combine the ingredients thoroughly; 2 tablespoons of minced cooked bacon may be added if desired.

Cheese-paste Sandwich Filling

4oz. of grated cheese
1 beaten egg
2 tablespoons of milk
2 level teaspoons of flour
Salt and pepper

Mix the milk and flour to a paste. Combine the ingredients and stir the mixtures over a very gentle heat or in a double boiler until it thickens.

This may be varied by adding tomatoes. Cook ½lb. of sliced skinned tomatoes or 1 cup of strained preserved tomatoes in a saucepan until they are soft. Add the grated cheese and continue cooking the mixture over hot water until it is blended. Add it to the remaining ingredients and stir the mixture until it thickens.

Cheese or Bacon Savouries

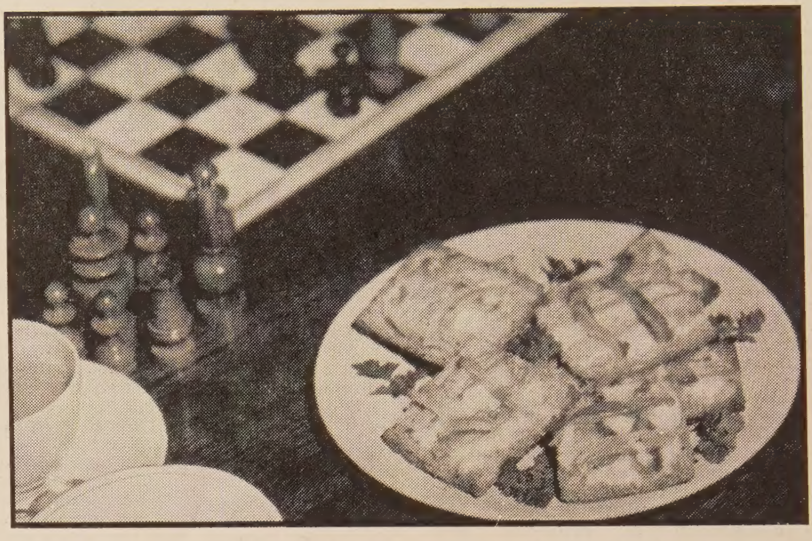
Cut bread thinly, spread it with butter, a slice of cheese and bacon, and bake it in the oven until it is crisp.

Lettuce Roll-ups

2 tablespoons of seedless raisins
¼ cup of cottage cheese or cheese paste
1 tablespoon of chopped nuts
1 tablespoon of grated raw carrot
¼ teaspoon of salt
Salad dressing
About 3 crisp lettuce leaves

Pour boiling water over the raisins, let them stand for 2 or 3 minutes, drain them, and combine them with the cheese, nuts, carrots, and salt. Add sufficient salad dressing to hold the mixture together. Store the mixture covered in a safe or refrigerator until just before packing the lunch. Spread it on the lettuce leaves, roll them up, and fasten them with wooden toothpicks.

TOAST THAT IS DIFFERENT



THE New Zealander's liking for toast, not only as a mainstay of the breakfast menu but for lunch, tea, and supper as well, is unquestioned. Whether it is a result of the infrequent bread deliveries common in many country districts, or of the long weekend, or of a natural preference for toasted bread may remain a subject for controversy. However, probably few people would not welcome an occasional change from plain buttered toast, or toast and marmalade, honey, or cheese, especially at holiday time when the housewife, no more willing than the rest of the family to spend unnecessary time inside baking, finds toast the simplest answer to the problem of providing her family with a quick and satisfying meal when the bread is stale and unpalatable.

THE following suggestions for "toast that is different" can be put into effect easily and quickly when a griller or electric oven is available.

Savoury Suggestions

Cheese dreams (illustrated above): Toast the bread on one side. Spread the untoasted side with mayonnaise, sliced tomato, seasoning, a layer of grated or sliced cheese, and finally a slice of bacon or a lattice of bacon strips. Grill it under a hot element for about 5 minutes and serve it hot.

Peanut-butter toast: Toast one side of the bread. Spread the untoasted side with peanut butter blended with chopped bacon and a small amount of dripping, place a slice of tomato on top, and return it to the oven or griller to be toasted.

Baked-bean toast: Toast the bread on one side and butter the untoasted side. Mash 1 cup of canned beans or beans in tomato sauce with 2 tablespoons of chopped onion or celery and spread some of the mixture on the buttered toast. Place a thin slice of bacon on top, return the toast to the oven, grill it for about 5 minutes, and serve it hot. Peanut butter may be used instead of butter as the basic spread, and sliced seasoned tomato may replace bacon as a "topper".

Sardine toast: Mash 1 tin of sardines with ½ cup of chopped celery, 3 tablespoons of salad dressing, 2 teaspoons of lemon juice, and seasoning. Toast bread on one side. Butter the untoasted side if desired, spread it with the sardine mixture, top it with a slice of cheese, and toast it in the oven or under a griller.

For the "Sweet-tooth"

Cinnamon toast: Butter the toast and sprinkle it with a mixture of sugar and cinnamon in equal quantities. Brown it lightly in the oven or under a griller.

Orange tea toast: Mix together 1 dessertspoon of grated orange rind, 2 tablespoons of orange juice, and ⅓ cup of the sugar and cinnamon mixture used for cinnamon toast. Spread the mixture on slices of buttered, toasted raisin or sultana bread and toast the bread for 2 or 3 minutes under the griller or in the top of the oven.

Sugar nut toast: Blend 2oz. of butter and 2oz. of brown sugar. Spread the mixture on toast, sprinkle it with chopped nuts, and brown it lightly in the oven or under a griller.

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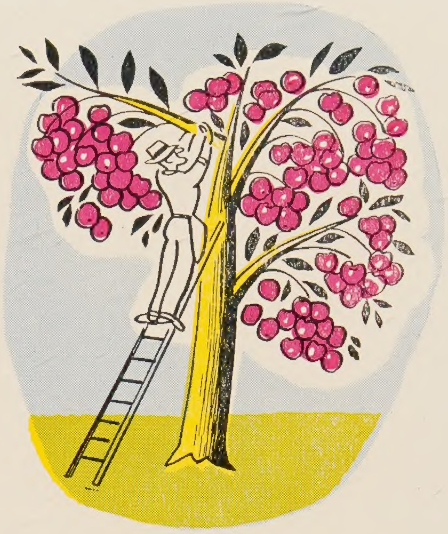

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